



ESIE09-08A



Service Manual

Daikin ALTHERMA HT

ERSQ 011/014/016 AA V1, Y1

ERRQ 011/014/016 AA V1, Y1

EKHBRD 011/014/016 AA/AB/AC V1, Y1

R-410A, R-134a

EKHTS(U) 200/260 A, AB, AC

EKBUHAA6 V3, W1

www.daikineurope.com

Table of Contents

Table of Contents	i
1. Introduction	vi
1.1 Safety Cautions	vi
1.2 PREFACE	x
Part 1 - General Information	1
1. Model Names of Indoor/Outdoor Units & Tanks	2
Part 2 - Specifications	5
1. Specifications	6
1.1 Outdoor Units	6
1.2 Indoor Unit	8
Part 3 - Refrigerant Circuit & Functional Parts	11
1. Refrigerant Circuit	12
1.1 Outdoor Unit	12
1.2 Indoor Unit	14
2. Functional Parts Layout	17
2.1 ERRQ 011/014/016 AAV1, ERSQ 011/014/016 AAV1	17
2.2 ERRQ 011/014/016 AAY1, ERSQ 011/014/016 AAY1	19
2.3 EKHBRD 011/014/016 AA(V1/Y1)	21
2.4 EKHBRD 011/014/016 AB/AC(V1/Y1)	23
2.5 EKHTS 200/260 A/AB/AC	24
2.6 EKHTSU 200/260 A/AB/AC	26
Part 4 - Electrical Circuit	29
1. Switch Box Layout - Indoor Unit EKHBRD	30
2. PCB Layout for EKHBRD 011/014/016 AA/AB/AC V1/Y1	34
2.1 Main PCB - A1P	34
2.2 Control - PCB - A3P	36
2.3 Inverter PCB - A4P	38
2.4 Filter PCB - A6P	41
2.5 QA PCB - A5P	43
2.6 Inverter Control PCB - Three Phase - A4P	44
2.7 Inverter PCB - Three Phase - A5P	46
2.8 Digital I/O PCB (Option PCB A7P)	48
2.9 Demand PCB (Option PCB A8P)	50
Part 5 - Function	53
1. Operation Mode	54
2. Basic Control	55

2.1	Normal Operation	55
2.2	Compressor PI Control	56
2.3	Electronic Expansion Valve PI Control R-410A circuit.....	57
2.4	Electronic Expansion Valve PI Control R-134a circuit.....	57
3.	Special Control.....	58
3.1	Startup Control.....	58
3.2	Defrosting Operation	59
3.3	Pump-down Residual Operation.....	60
3.4	Stopping Operation.....	61
4.	Protection Control	62
4.1	High Pressure Protection Control	62
4.2	Low Pressure Protection Control.....	64
4.3	Discharge Pipe Protection Control	66
4.4	Inverter Protection Control	67
5.	Other Control	69
5.1	Heating Operation Prohibition.....	69
5.2	Inverter Fan Control (Switch Box Fan)	69
5.3	Crankcase Heater.....	69
6.	Outline of Control (Indoor Unit).....	70
6.1	Freeze Prevention	70
6.2	Simultaneous demand of space heating and domestic water heating	71

Part 6 - Test Operation..... 77

1.	Test Operation.....	78
1.1	Procedure and Outline	78
1.2	Air Tight Test and Vacuum Drying.....	80
1.3	Additional Refrigerant Charge	81
1.4	Operation when Power is Turned On	85
2.	Outdoor Unit PC Board Layout	86
3.	Field Setting	87
3.1	Field Setting from remote control.....	87
3.2	Field Setting from Outdoor Unit.....	115

Part 7 - Troubleshooting..... 127

1.	Symptom-based Troubleshooting	129
2.	Troubleshooting by Remote Control.....	131
2.1	The INSPECTION / TEST Button	131
2.2	Self-diagnosis by Wired Remote Control.....	132
2.3	Operation of the Remote Controller's Inspection / Test Operation Button.....	133
2.4	Remote Control Service Mode	134
2.5	Remote Controller Self-Diagnosis Function	136
3.	Troubleshooting by Indication on the Remote Controller	142
3.1	"F1" Indoor Unit: PC Board Defect	142
3.2	"F6" Indoor Unit: Pump Error (M1P) or Other Water System Error.....	143
3.3	"F9" Indoor Unit: Malfunction of Moving Part of Electronic Expansion Valve (K1E) R-410A circuit.....	144
3.4	"FE" Indoor Unit: Water Circuit Error	146
3.5	"FJ" Indoor Unit: Malfunction of Capacity Determination Device.....	147
3.6	"E1" Indoor Unit: Failure of Transmission (Between Indoor unit PC Board and Control PC Board).....	148

3.7	“C4” Indoor Unit: Malfunction of Thermistor (R3T) Liquid Thermistor R-410A	150
3.8	“C5” Indoor Unit: Malfunction of Tank Thermistor (R2T).....	151
3.9	“C9” Indoor Unit: Return Water Thermistor (R4T)	152
3.10	“C11” Indoor Unit: Leaving Water Thermistor Error (R5T).....	153
3.11	“C12” Indoor Unit: Malfunction of Thermostat Sensor in Remote Controller ..	154
3.12	“E1” Outdoor Unit: PC Board Defect.....	155
3.13	“E1” Indoor Unit: PC Board Defect	156
3.14	“E3” Outdoor Unit: Actuation of High Pressure Switch	157
3.15	“E3” Indoor Unit: Actuation of High Pressure Switch	159
3.16	“E4” Outdoor Unit: Actuation of Low Pressure Sensor	162
3.17	“E4” Indoor Unit: Actuation of Low Pressure Sensor.....	164
3.18	“E5” Outdoor Unit: Inverter Compressor Motor Lock.....	166
3.19	“E5” Indoor Unit: Inverter Compressor Motor Lock	167
3.20	“E7” Malfunction of Outdoor Unit Fan Motor	168
3.21	“E9” Outdoor Unit: Malfunction of Moving Part of Electronic Expansion Valve.	170
3.22	“E9” Indoor Unit: Malfunction of Moving Part of Electronic Expansion Valve (K2E) R-134a circuit	172
3.23	“F3” Outdoor Unit: Abnormal Discharge Pipe Temperature	174
3.24	“F3” Indoor Unit: Abnormal Discharge Pipe Temperature	175
3.25	“H9” Outdoor Unit: Malfunction of Thermistor (R1T) for Outdoor Air.....	176
3.26	“J3” Outdoor Unit: Malfunction of Discharge Pipe Thermistor (R2T)	177
3.27	“J3” Indoor Unit: Malfunction of Discharge Pipe Thermistor (R6T).....	178
3.28	“J5” Outdoor Unit: Malfunction of Thermistor (R3T, R5T) for Suction Pipe 1, 2	179
3.29	“J5” Indoor Unit: Malfunction of Thermistor (R7T) for Liquid R-134a.....	180
3.30	“J6” Outdoor Unit: Malfunction of Thermistor (R6T) for Outdoor Unit Heat Ex- changer	181
3.31	“J7” Outdoor Unit: Malfunction of Thermistor (R7T) for Outdoor Unit Liquid Pipe	182
3.32	“J9” Outdoor Unit: Malfunction of Thermistor (R4T) for Subcooling Heat Ex- changer Gas Pipe	183
3.33	“J11” Outdoor Unit: Malfunction of High Pressure Sensor	184
3.34	“J11” Indoor Unit: Malfunction of High Pressure Sensor	185
3.35	“J12” Outdoor Unit: Malfunction of Low Pressure Sensor	186
3.36	“J12” Indoor Unit: Malfunction of Low Pressure Sensor	187
3.37	“L1” Outdoor Unit: Malfunction of PC Board	188
3.38	“L1” Indoor Unit: Malfunction of PC Board	189
3.39	“L4” Outdoor Unit: Malfunction of Inverter Radiating Fin Temperature Rise	190
3.40	“L4” Indoor Unit: Malfunction of Inverter Radiating Fin Temperature Rise (R8T)	191
3.41	“L5” Outdoor Unit: Inverter Compressor Abnormal - R-410A	192
3.42	“L5” Indoor Unit: Inverter Compressor Abnormal - R-134a	193
3.43	“L8” Outdoor Unit: Inverter Current Abnormal	194
3.44	“L8” Indoor Unit: Inverter Current Abnormal.....	195
3.45	“L9” Outdoor Unit: Inverter Start up Error	196
3.46	“L9” Indoor Unit: Inverter Start up Error	197
3.47	“L12” Outdoor Unit: Malfunction of Transmission between Inverter and Control PC Board	198
3.48	“L12” Indoor Unit: Malfunction of Transmission between Inverter and Control PC	








Board	199
3.49 “LH” Indoor Unit: Converter Error	200
3.50 “PI” Outdoor Unit: High Voltage of Capacitor in Main Inverter Circuit	201
3.51 “PI” Indoor Unit: High Voltage of Capacitor in Main Inverter Circuit.....	202
3.52 “PL” Indoor Unit: Faulty Combination of PCB	203
3.53 “LU” Low Pressure Drop Due to Refrigerant Shortage or Electronic Expansion Valve Failure	204
3.54 “LZ” Power Supply Insufficient or Instantaneous Failure.....	206
3.55 “LZ” Power Supply Insufficient or Instantaneous Failure.....	208
3.56 “LY” Malfunction of Transmission between Indoor Unit and Outdoor Unit ...	210
3.57 “LY” Malfunction of Transmission Indoor Unit.....	212
3.58 “LY” Malfunction of Transmission between Remote Control and Indoor Unit	213
3.59 “LY” Indoor Unit: Malfunction of Transmission Outdoor Unit.....	214
3.60 “LB” Malfunction of Transmission between Main and Sub Remote Controls.	215
3.61 “LB” Communication Error between Outdoor Unit and Indoor Unit.....	216
3.62 “LF” System is not Set yet	217
3.63 “LH” Malfunction of System, Refrigerant System Address Undefined	218
Part 8 - Appendix	223
1. Piping Diagrams.....	224
1.1 Outdoor Unit.....	224
1.2 Indoor Unit.....	226
1.3 Switch Box Layout	229
2. Wiring Diagrams.....	233
2.1 Outdoor Unit.....	233
2.2 Field Wiring Connection Diagram	237
2.3 Indoor Unit.....	238
3. Thermistor Resistance / Temperature Characteristics	251
4. Pressure Sensor	254
5. Method of Replacing the Inverter’s Power Transistors Modules	255
6. External Backup Heater Kit	258
6.1 Model Name	258
6.2 Main Components.....	259
6.3 Technical Specifications.....	261
6.4 Detailed Explanation of Setting Modes.....	262
6.5 External Backup Heater Control.....	263
6.6 Troubleshooting by Indication on the Remote Controller.....	265
6.7 Troubleshooting: General Symptoms	266
6.8 Switch Box Layout	267
6.9 Wiring Diagrams	269
7. 3-Way Valve	273
7.1 Build-Up of 3-Way Valve	273
7.2 Troubleshooting Overview 3-Way Valve.....	274
7.3 How to Verify If 3-Way Valve is Installed Correctly	275
Part 9- Precautions for New Refrigerant (R-410A)	279
1. Precautions for New Refrigerant (R-410A)	280
1.1 Outline	280
1.2 Refrigerant Cylinders.....	282

1.3 Service Tools	283
Index	i
Drawings & Flow Charts	iii



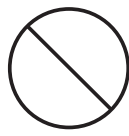



1. Introduction








1.1 Safety Cautions

Cautions and Warnings


- Be sure to read the following safety cautions before conducting repair work.
- The caution items are classified into “ **Warning**” and “ **Caution**”. The “ **Warning**” items are especially important since they can lead to death or serious injury if they are not followed closely. The “ **Caution**” items can also lead to serious accidents under some conditions if they are not followed. Therefore, be sure to observe all the safety caution items described below.
- About the pictograms
 -  This symbol indicates an item for which caution must be exercised.
The pictogram shows the item to which attention must be paid.
 -  This symbol indicates a prohibited action.
The prohibited item or action is shown inside or near the symbol.
 -  This symbol indicates an action that must be taken, or an instruction.
The instruction is shown inside or near the symbol.
- After the repair work is complete, be sure to conduct a test operation to ensure that the equipment operates normally, and explain the cautions for operating the product to the customer




1.1.1 Caution in Repair



 Warning	
Be sure to disconnect the power cable plug from the plug socket before disassembling the equipment for a repair. Working on the equipment that is connected to a power supply can cause an electrical shock. If it is necessary to supply power to the equipment to conduct the repair or inspecting the circuits, do not touch any electrically charged sections of the equipment. Be careful as the capacitors (top surfaces) can hold up to 220V.	
If the refrigerant gas discharges during the repair work, do not touch the discharging refrigerant gas. The refrigerant gas can cause frostbite.	
When disconnecting the suction or discharge pipe of the compressor at the welded section, release the refrigerant gas completely at a well-ventilated place first. If there is a gas remaining inside the compressor, the refrigerant gas or refrigerating machine oil discharges when the pipe is disconnected, and it can cause injury.	
If the refrigerant gas leaks during the repair work, ventilate the area. The refrigerant gas can generate toxic gases when it contacts flames.	
The step-up capacitor supplies high-voltage electricity to the electrical components of the outdoor unit and indoor unit. Be sure to discharge the capacitor completely before conducting repair work. A charged capacitor can cause an electrical shock as the capacitors (top surfaces) can hold up to 220V.	
Do not start or stop the heat pump operation by plugging or unplugging the power cable plug. Plugging or unplugging the power cable plug to operate the equipment can cause an electrical shock or fire.	

 Caution	
Do not repair the electrical components with wet hands. Working on the equipment with wet hands can cause an electrical shock.	
Do not clean the heat pump by splashing water. Washing the unit with water can cause an electrical shock.	
Be sure to provide the grounding when repairing the equipment in a humid or wet place, to avoid electrical shocks.	
Be sure to turn off the power switch and unplug the power cable when cleaning the equipment. The internal fan rotates at a high speed, and cause injury.	
Do not tilt the unit when removing it. The water inside the unit can spill and wet the furniture and floor.	
Be sure to check that the refrigerating cycle section has cooled down sufficiently before conducting repair work. Working on the unit when the refrigerating cycle section is hot can cause burns.	
Use the welder in a well-ventilated place. Using the welder in an enclosed room can cause oxygen deficiency.	





1.1.2 Cautions Regarding Products after Repair


 Warning	
Be sure to use parts listed in the service parts list of the applicable model and appropriate tools to conduct repair work. Never attempt to modify the equipment. The use of inappropriate parts or tools can cause an electrical shock, excessive heat generation or fire.	
When relocating the equipment, make sure that the new installation site has sufficient strength to withstand the weight of the equipment. If the installation site does not have sufficient strength and if the installation work is not conducted securely, the equipment can fall and cause injury.	
Be sure to use an exclusive power circuit for the equipment, and follow the technical standards related to the electrical equipment, the internal wiring regulations and the instruction manual for installation when conducting electrical work. Insufficient power circuit capacity and improper electrical work can cause an electrical shock or fire.	
Be sure to use the specified cable to connect between the indoor and outdoor units. Make the connections securely and route the cable properly so that there is no force pulling the cable at the connection terminals. Improper connections can cause excessive heat generation or fire.	
When connecting the cable between the indoor and outdoor units, make sure that the terminal cover does not lift off or dismount because of the cable. If the cover is not mounted properly, the terminal connection section can cause an electrical shock, excessive heat generation or fire.	



 Warning	
Do not damage or modify the power cable. Damaged or modified power cable can cause an electrical shock or fire. Placing heavy items on the power cable, and heating or pulling the power cable can damage the cable.	
Do not mix air or gas other than the specified refrigerant (R-410A / R-134a) in the refrigerant system. If air enters the refrigerating system, an excessively high pressure results, causing equipment damage and injury.	
If the refrigerant gas leaks, be sure to locate the leak and repair it before charging the refrigerant. After charging refrigerant, make sure that there is no refrigerant leak. If the leak cannot be located and the repair work must be stopped, be sure to perform pump-down and close the service valve, to prevent the refrigerant gas from leaking into the room. The refrigerant gas itself is harmless, but it can generate toxic gases when it contacts flames, such as fan and other heaters, stoves and ranges.	

 Caution	
Installation of a leakage breaker is necessary in some cases depending on the conditions of the installation site, to prevent electrical shocks.	
Do not install the equipment in a place where there is a possibility of combustible gas leaks. If a combustible gas leaks and remains around the unit, it can cause a fire.	
Be sure to install the packing and seal on the installation frame properly. If the packing and seal are not installed properly, water can enter the room and wet the furniture and floor.	For integral units only

1.1.3 Inspection after Repair

 Warning	
Check to make sure that the power cable plug is not dirty or loose, then insert the plug into a power outlet all the way. If the plug has dust or loose connection, it can cause an electrical shock or fire.	
If the power cable and lead wires have scratches or deteriorated, be sure to replace them. Damaged cable and wires can cause an electrical shock, excessive heat generation or fire.	
Do not use a joined power cable or extension cable, or share the same power outlet with other electrical appliances, since it can cause an electrical shock, excessive heat generation or fire.	





 Caution	
Check to see if the parts and wires are mounted and connected properly, and if the connections at the soldered or crimped terminals are secure. Improper installation and connections can cause excessive heat generation, fire or an electrical shock.	
If the installation platform or frame has corroded, replace it. Corroded installation platform or frame can cause the unit to fall, resulting in injury.	

 Caution	
Check the grounding, and repair it if the equipment is not properly grounded. Improper grounding can cause an electrical shock.	
Be sure to measure the insulation resistance after the repair, and make sure that the resistance is 1 Mohm or higher. Faulty insulation can cause an electrical shock.	
Be sure to check the drainage of the indoor unit after the repair. Faulty drainage can cause the water to enter the room and wet the furniture and floor.	

1.1.4 Using Icons

Icons are used to attract the attention of the reader to specific information. The meaning of each icon is described in the table below:

1.1.5 Using Icons List

Icon	Type of Information	Description
 Note:	Note	A “note” provides information that is not indispensable, but may nevertheless be valuable to the reader, such as tips and tricks.
 Caution	Caution	A “caution” is used when there is danger that the reader, through incorrect manipulation, may damage equipment, lose data, get an unexpected result or has to restart (part of) a procedure.
 Warning	Warning	A “warning” is used when there is danger of personal injury.
	Reference	A “reference” guides the reader to other places in this binder or in this manual, where he/she will find additional information on a specific topic.

1.2 PREFACE

Thank you for your continued patronage of Daikin products.

This is the new service manual for Daikin's Year 2009 Daikin Altherma HT (high temperature) air to water heat pump.

Daikin offers a wide range of models to respond to the residential heating market. We are confident that customers will be able to find the models that best suit their needs.

This service manual contains information regarding the servicing of Daikin Altherma HT (R-410A & R-134a) Heat Pump System.

August, 2009

After Sales Service Division

Part 1 - General Information

1. Model Names of Indoor/Outdoor Units & Tanks	2
--	---

1. Model Names of Indoor/Outdoor Units & Tanks

Indoor Units

Type	Model Name	Version			Power Supply
EKHBRD	011	AA	AB	AC	V1
	014				
	016				
EKHBRD	011	AA	AB	AC	Y1
	014				
	016				

Outdoor Units

Type	Model Name	Version	Power Supply
ERRQ	011	AA	V1
	014		
	016		
ERRQ	011	AA	Y1
	014		
	016		
ERSQ	011	AA	V1
	014		
	016		
ERSQ	011	AA	Y1
	014		
	016		

Tank

Model Name	Version		
EKHTS 200	AA	AB	AC
EKHTS 260			
EKHTSU 200	AA	AB	AC
EKHTSU 260			

Part 2 - Specifications

1. Specifications	6
1.1 Outdoor Units	6
1.2 Indoor Unit.....	8

1. Specifications

1.1 Outdoor Units

Capacity Information

For combination indoor units + outdoor units	Indoor Units				EKHBRD011AA/AB/AC(V1/Y1)	EKHBRD014AA/AB/AC(V1/Y1)	EKHBRD016AA/AB/AC(V1/Y1)
	Condition 1	Heating capacity	Nominal	kW	11	14	16
		Heating PI	Nominal	kW	3,57	4,66	5,57
		COP	Nominal		3,08	3,00	2,88
	Condition 2	Heating capacity	Nominal	kW	11	14	16
		Heating PI	Nominal	kW	4,40	5,65	6,65
		COP	Nominal		2,50	2,48	2,41
	Condition 3	Heating capacity	Nominal	kW	11	14	16
		Heating PI	Nominal	kW	2,61	3,55	4,31
		COP	Nominal		4,22	3,94	3,72
<u>Notes</u> Condition 1 EW: 55°C, LW: 65°C, ΔT=10°C Ambient conditions: 7°CDB/6°CWB Condition 2 EW: 70°C, LW: 80°C, ΔT=10°C Ambient conditions: 7°CDB/6°CWB Condition 3 EW: 30°C, LW: 35°C, ΔT=5°C Ambient conditions: 7°CDB/6°CWB				<u>Remark:</u> This data is only valid in combination of indoor unit with ER(R/S)Q outdoor unit			

Technical Specifications

Outdoor units				ER(S/R)Q011AA(V1/Y1)	ER(S/R)Q014AA(V1/Y1)	ER(S/R)Q016AA(V1/Y1)
Casing	Colour			Daikin White	Daikin White	Daikin White
	Material			Painted galvanised steel	Painted galvanised steel	Painted galvanised steel
Dimensions	Unit	Height	mm	1345	1345	1345
		Width	mm	900	900	900
		Depth	mm	320	320	320
	Packing	Height	mm	1524	1524	1524
		Width	mm	980	980	980
		Depth	mm	420	420	420
Weight	Unit		kg	120	120	120
	Packed Unit		kg	130	130	130
Packing	Material			Cardboard + Wood + EPS	Cardboard + Wood + EPS	Cardboard + Wood + EPS
	Weight		kg	8	8	8
Heat Exchanger	Specifications	Length	mm	857	857	857
		Nr of Rows		2	2	2
		Fin Pitch	mm	2	2	2
		Nr of Passes		10	10	10
		Face Area	m²	1,131	1,131	1,131
		Nr of Stages		60	60	60
		Empty Tubeplate Hole		0	0	0
	Tube type		Hi-XSS	Hi-XSS	Hi-XSS	
	Fin	Type	Non-symmetric waffle louvre		Non-symmetric waffle louvre	Non-symmetric waffle louvre
		Treatment	Corrosion resistant		Corrosion resistant	Corrosion resistant
Fan	Type			Propellor	Propellor	Propellor
	Quantity			2	2	2
	Discharge direction			Horizontal	Horizontal	Horizontal
	Motor	Quantity		2	2	2
		Model		Brushless DC motor	Brushless DC motor	Brushless DC motor
		Output	W	70	70	70
		Drive		Direct drive	Direct drive	Direct drive
Compressor	Quantity			1	1	1
	Motor	Type		Hermetically sealed scroll compressor	Hermetically sealed scroll compressor	Hermetically sealed scroll compressor
		Starting Method		Direct on line	Direct on line	Direct on line
		Crankcase Heater	Quantity	1	1	1
			Output	W	33	33
Operation Range ⁽¹⁾	Heating	Minimum ambient	°C	-20	-20	-20
		Maximum ambient	°C	20	20	20
	Domestic hot water	Minimum ambient	°C	-20	-20	-20
		Maximum ambient	°C	35	35	35

Outdoor units				ER(S/R)Q011AA(V1/Y1)	ER(S/R)Q014AA(V1/Y1)	ER(S/R)Q016AA(V1/Y1)
Sound Level (nominal)	Heating	Sound Power	dBA	See technical data		
		Sound Pressure	dBA			
Refrigerant	Type			R-410A	R-410A	R-410A
	Charge		kg	4,5	4,5	4,5
	Control			Expansion valve (electronic)	Expansion valve (electronic)	Expansion valve (electronic)
	Nr of Circuits			1	1	1
Refrigerant Oil	Type			Daphne FVC68D	Daphne FVC68D	Daphne FVC68D
	Charged Volume		l	1,5	1,5	1,5
Piping Connections	Liquid	Quantity		1	1	1
		Type		Flare	Flare	Flare
		Diameter (OD)	mm	9,52	9,52	9,52
	Gas	Quantity		1	1	1
		Type		Flare	Flare	Flare
		Diameter (OD)	mm	15,9	15,9	15,9
	Drain	Quantity		3	3	3
		Diameter (OD)	mm	26 x 3	26 x 3	26 x 3
	Piping Length	Minimum	m	3	3	3
		Maximum	m	50	50	50
		Equivalent	m	63	63	63
		Chargeless	m	10	10	10
	Additional Refrigerant Charge		kg/m	see installation manual	see installation manual	see installation manual
	Installation height difference	Maximum	m	30	30	30
	Heat Insulation			Both liquid and gas pipes	Both liquid and gas pipes	Both liquid and gas pipes
Defrost Method				Reversed cycle	Reversed cycle	Reversed cycle
Defrost Control				Sensor for outdoor heat exchanger temperature	Sensor for outdoor heat exchanger temperature	Sensor for outdoor heat exchanger temperature
Capacity Control Method				Inverter controlled	Inverter controlled	Inverter controlled
Safety Devices (pressure)				HPS	HPS	HPS
Safety Devices (fan)				Fan motor thermal protector	Fan motor thermal protector	Fan motor thermal protector
Safety Devices (inverter)				Inverter overload protector	Inverter overload protector	Inverter overload protector
Safety Devices (pcb)				PC board fuse	PC board fuse	PC board fuse
Standard Accessories	Item			Installation manual	Installation manual	Installation manual
	Quantity			1	1	1
Design pressure (high pressure side)			bar	40	40	40
Notes						
(1): for details see operation range TW drawing						

Electrical Specifications

Power Supply	Name			ER(S/R)Q(011/014/016)AAV1	ER(S/R)Q(011/014/016)AAY1
	Phase			1~	3~
	Frequency		Hz	50	50
	Voltage		V	220-240	380-415
	Voltage Range	Minimum	V	198	342
Maximum		V	254	440	
Current	Z-max ⁽²⁾		Ω	0,28	-
	Minimum Ssc ⁽³⁾ value		kVa	Equipment complying with EN/IEC 61000-3-12 ⁽¹⁾	-
	Maximum running Current	Heating	A	27	13,5
	Recommended fuses		A	32	16
Wiring Connections	For power supply	Quantity		2G	4G
		Wire type		Note ⁽⁴⁾	Note ⁽⁴⁾
	For connection with indoor unit	Quantity		2	
		Remark		F1+F2	
Power Supply Intake			Both indoor and outdoor unit		
Notes					
(1): European/International Technical Standard setting the limits for harmonic currents produced by equipment connected to public low-voltage systems with input current > 16A and ≤ 75A per phase					
(2): In accordance with EN/IEC 61000-3-11 ⁽⁵⁾ , it may be necessary to consult the distribution network operator to ensure that the equipment is connected only to a supply with Zsys ⁽⁶⁾ ≤ Zmax					
(3): Short-circuit power					
(4): Select diameter and type according to national and local regulations					
(5): European/International Technical Standard setting the limits for voltage changes, voltage fluctuations and flicker in public low-voltage supply systems for equipment with rated current ≤ 75A					
(6): Svsstem impedance					

1.2 Indoor Unit

Capacity Information

For combination indoor units + outdoor units	Indoor Units				EKHBRD011AA/AB/AC(V1/Y1)	EKHBRD014AA/AB/AC(V1/Y1)	EKHBRD016AA/AB/AC(V1/Y1)
	Condition 1	Heating capacity	Nominal	kW	11	14	16
		Heating PI	Nominal	kW	3,57	4,66	5,57
		COP	Nominal		3,08	3,00	2,88
	Condition 2	Heating capacity	Nominal	kW	11	14	16
		Heating PI	Nominal	kW	4,40	5,65	6,65
		COP	Nominal		2,50	2,48	2,41
	Condition 3	Heating capacity	Nominal	kW	11	14	16
		Heating PI	Nominal	kW	2,61	3,55	4,31
		COP	Nominal		4,22	3,94	3,72
<u>Notes</u> Condition 1 EW: 55°C, LW: 65°C, ΔT=10°C Ambient conditions: 7°CDB/6°CWB Condition 2 EW: 70°C, LW: 80°C, ΔT=10°C Ambient conditions: 7°CDB/6°CWB Condition 3 EW: 30°C, LW: 35°C, ΔT=5°C Ambient conditions: 7°CDB/6°CWB				Remark: This data is only valid in combination of indoor unit with ER(R/S)Q outdoor unit			

Technical Specifications

Indoor units				EKHBRD011AA/AB/AC(V1/Y1)			EKHBRD014AA/AB/AC(V1/Y1)			EKHBRD016AA/AB/AC(V1/Y1)		
				AA	AB	AC	AA	AB	AC	AA	AB	AC
Casing	Colour			Metallic Grey			Metallic Grey			Metallic Grey		
	Material			pre coated sheetmetal			pre coated sheetmetal			pre coated sheetmetal		
Dimensions	Packing	Height	mm	860			860			860		
		Width	mm	680			680			680		
		Depth	mm	800			800			800		
	Unit	Height	mm	705			705			705		
		Width	mm	600			600			600		
		Depth	mm	695			695			695		
Weight	Machine weight			kg			144,25 / 147,25			144,25 / 147,25		
	Gross weight			kg			153 / 156			153 / 156		
Packing	Material			EPS, Cardboard, MDF, Wood (pallet), Metal			EPS, Cardboard, MDF, Wood (pallet), Metal			EPS, Cardboard, MDF, Wood (pallet), Metal		
	Weight			kg			8,75			8,75		

Indoor units				EKHBRD011AA/AB/AC(V1/Y1)			EKHBRD014AA/AB/AC(V1/Y1)			EKHBRD016AA/AB/AC(V1/Y1)			
Main components				AA	AB	AC	AA	AB	AC	AA	AB	AC	
	Refrigerant side heat exchanger	Type		Plate heat exchanger			Plate heat exchanger			Plate heat exchanger			
		Quantity		1 (60 plates)			1 (60 plates)			1 (60 plates)			
		Material		AISI 316			AISI 316			AISI 316			
		Insulation material		EPDM type	Thermal felt/foam	PPE foam	EPDM type	Thermal felt/foam	PPE foam	EPDM type	Thermal felt/foam	PPE foam	
	Cascade compressor	Quantity		1			1			1			
		Motor	Type		Hermetically sealed scroll compressor			Hermetically sealed scroll compressor			Hermetically sealed scroll compressor		
			Starting Method		Direct online			Direct online			Direct online		
			Crankcase Heater	Quantity		1		1	1		1	1	
		Crankcase Heater Output	W	33	33		33	33		33	33		
	Pump	Type		DC motor			DC motor			DC motor			
		Nr. of speed		inverter controlled			inverter controlled			inverter controlled			
		Nominal ESP unit ⁽¹⁾	Heating	kPa	94,0	92	92	91,9	88	88	89,7	85	85
		Power input		W	87			95			101		
	Water side Heat exchanger	Type		Plate heat exchanger			Plate heat exchanger			Plate heat exchanger			
		Quantity		1 (50 plates)			1 (50 plates)			1 (50 plates)			
		Material		AISI 316			AISI 316			AISI 316			
		Water volume		l	2,78			2,78			2,78		
		Water flow rate Nom. ⁽¹⁾		l/min	15,8			20,1			22,9		
		Water flow rate Max. ⁽²⁾		l/min	31,6			40			45,8		
		Insulation material		EPDM type	Thermal felt/foam	PPE	EPDM type	Thermal felt/foam	PPE	EPDM type	Thermal felt/foam	PPE	
		Expansion vessel	Volume		l	12			12			12	
	Max. water pressure		bar	3			3			3			
Pre pressure			bar	1			1			1			
Water filter	Diameter perforations		mm	1			1			1			
	Material		Brass			Brass			Brass				
Water circuit	Piping connections diameter		inch	G 1”1/4 (female)			G 1”1/4 (female)			G 1”1/4 (female)			
	Piping		inch	1”			1”			1”			
	Safety valve		bar	3			3			3			
	Manometer		Y/N	Y			Y			Y			
	Drain valve / Fill valve		Y/N	Y			Y			Y			
	Shut off valve		Y/N	Y			Y			Y			
	Air purge valve		Y/N	Y			Y			Y			
	Heating water system minimum water volume		l	20			20			20			
	Heating water system maximum water volume		l	400			400			400			
Refrigerant Circuit	Gas side diameter		mm	15,9			15,9			15,9			
	Liquid side diameter		mm	9,52			9,52			9,52			
	Type		Casc.	R134a			R134a			R134a			
	Charged amount		Casc.										
	Design pressure (high pressure side)		bar	38			38			38			
Refrigerant oil	Type		Casc.	Daphne FVC68D			Daphne FVC68D			Daphne FVC68D			
	Charged amount		Casc.	1,5l			1,5l			1,5l			
Sound Level ⁽³⁾	Sound Pressure at 55 - 65 °C [EW - LW] ⁽⁴⁾		dBA	43			45			46			
	Sound Pressure at 70 - 80 °C [EW - LW] ⁽⁴⁾		dBA	46			46			46			
	Sound Pressure low sound mode n° 1 at 55 - 65 °C [EW - LW] ⁽⁴⁾		dBA	40			43			45			
Operation range ⁽⁵⁾	Ambient	Minimum	°C	-20			-20			-20			
		Maximum	°C	20/(35) ⁽⁶⁾			20/(35) ⁽⁶⁾			20/(35) ⁽⁶⁾			
	Waterside	Minimum LW	°C	25			25			25			
		Maximum LW	°C	80			80			80			
Installation place				Indoor			Indoor			Indoor			

Notes

(1): for $\Delta T = 10^\circ\text{C}$ (2): for $\Delta T = 5^\circ\text{C}$

(3): The data mentioned is valid in free field condition because it is measured in a semi-anechoic room. Measured value under actual installation conditions will be higher due to environmental noise and sound reflections. These values are sound pressure levels measured at all sides (front / back / left / right / top) at 1m distance (see engineering data book for more details). The values do not occur simultaneously on all mentioned sides

(4): EW = entering water temperature - LW = leaving water temperature

(5): for details see operation range TW drawing

(6): for DHW operation

Electrical Specifications

Power Supply	Name			EKHBRD(011/014/016)AA/AB/ACV1			EKHBRD(011/014/016)AA/AB/ACY1		
				11	14	16	11	14	16
	Phase			1~			3~		
	Frequency		Hz	50			50		
	Voltage		V	220-240			380-415		
	Voltage Range	Minimum	V	198			342		
Maximum		V	254			440			
Current	Z-max ⁽²⁾		Ω	0,34	0,32	0,32	-		
	Minimum Ssc ⁽³⁾ value		kVa	Equipment complying with EN/IEC 61000-3-12 ⁽¹⁾			-		
	Maximum running Current	Heating	A	22,5	23,8	23,8	12,5		
	Recommended fuses		A	25			16		
Wiring Connections	For power supply	Quantity	2G			4G			
		Wire type	Note ⁽⁴⁾			Note ⁽⁴⁾			
	For power supply ⁽⁵⁾	Quantity	2G + 2G			4G + 2G			
		Wire type	Note ⁽⁴⁾			Note ⁽⁴⁾			
	For connection with outdoor unit	Quantity	2						
		Remark	F1+F2						
Power Supply Intake				Both indoor unit and outdoor unit					
Notes									
(1): European/International Technical Standard setting the limits for harmonic currents produced by equipment connected to public low-voltage systems with input current > 16A and ≤ 75A per phase									
(2): In accordance with EN/IEC 61000-3-11 ⁽⁶⁾ , it may be necessary to consult the distribution network operator to ensure that the equipment is connected only to a supply with Zsys ⁽⁷⁾ ≤ Zmax									
(3): Short-circuit power									
(4): Select diameter and type according to national and local regulations									
(5): In case of benefit kWh rate power supply installations									
(6): European/International Technical Standard setting the limits for voltage changes, voltage fluctuations and flicker in public low-voltage supply systems for equipment with rated current ≤ 75A									
(7): System impedance									

Part 3 - Refrigerant Circuit & Functional Parts

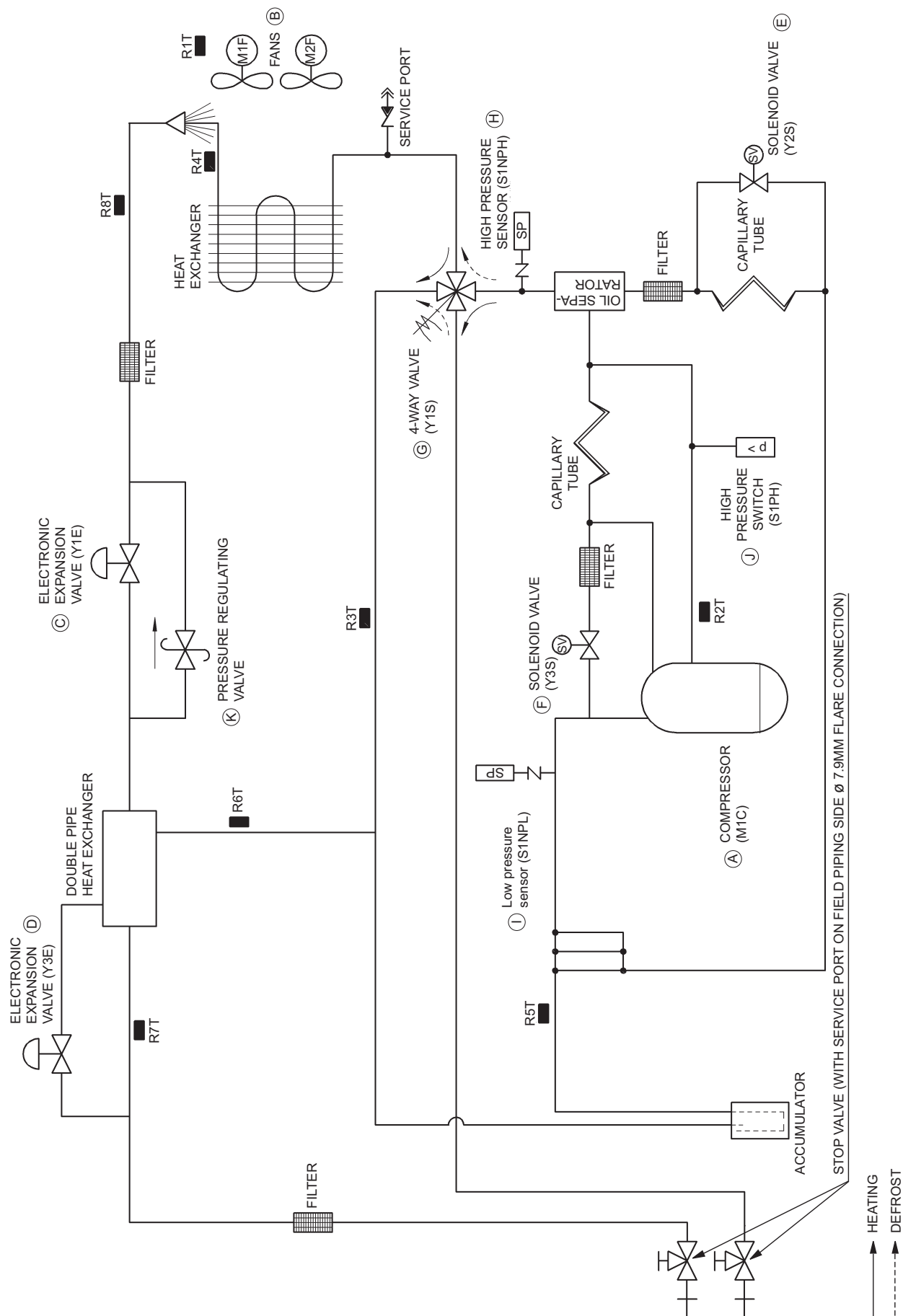
1. Refrigerant Circuit	12
1.1 Outdoor Unit.....	12
1.2 Indoor Unit	14
2. Functional Parts Layout	17
2.1 ERRQ 011/014/016 AAV1, ERSQ 011/014/016 AAV1.....	17
2.2 ERRQ 011/014/016 AAY1, ERSQ 011/014/016 AAY1.....	19
2.3 EKHBRD 011/014/016 AA(V1/Y1)	21
2.4 EKHBRD 011/014/016 AB/AC(V1/Y1).....	23
2.5 EKHTS 200/260 A/AB/AC	24
2.6 EKHTSU 200/260 A/AB/AC	26

1. Refrigerant Circuit

1.1 Outdoor Unit

ERRQ - ERSQ

No. in refrigerant system diagram	Symbol	Name	Major Function
A	M1C	Inverter compressor (INV)	Inverter compressor is operated on frequencies between 36 Hz and 195 Hz by using the inverter. In total there are 31 steps.
B	M1F M2F	Inverter fan	Since the system is of air heat exchanging type, the fan is operated at 8 (9)-step rotation speed by using the inverter.
C	Y1E	Electronic expansion valve (Main: EV1)	While in heating operation, PI control is applied to keep the outlet superheated degree of air heat exchanger constant.
D	Y3E	Electronic expansion valve (Subcool: EV3)	PI control is applied to keep the outlet superheated degree of subcooling heat exchanger constant.
E	Y2S	Solenoid valve (Hot gas: SVP)	Used to prevent the low pressure from transient falling.
F	Y3S	Solenoid valve (Unload circuit SVUL)	Used to the unloading operation of compressor.
G	Y1S	Four way valve	Used to switch the operation mode between defrosting and heating. Activated during heating (opposite concerning indoor unit).
H	S1NPH	High pressure sensor	Used to detect high pressure.
I	S1NPL	Low pressure sensor	Used to detect low pressure.
J	S1PH	HP pressure switch (For INV compressor)	In order to prevent the increase of high pressure when a malfunction occurs, this switch is activated at high pressure of 4.0 MPa or more to stop the compressor operation.
K	—	Pressure regulating valve 1 (Receiver to discharge pipe)	This valve opens at a pressure of 4.0 MPa for prevention of pressure increase, thus resulting in no damage of functional parts due to the increase of pressure in transportation or storage.
1	R1T	Thermistor (Outdoor air: Ta)	Used to detect outdoor temperature, correct discharge pipe temperature, and others.
2	R2T	Thermistor (INV discharge pipe: Tdi)	used to detect discharge pipe temperature, make the temperature protection control of compressor, and others.
3	R3T	Thermistor (Suction pipe1: Ts1)	used to detect suction pipe temperature, keep the suction superheated degree constant in heating operation, and others.
4	R4T	Thermistor (Heat exchanger deicer: Tb)	Used to detect liquid pipe temperature of air heat exchanger, determine defrosting operation, and others.
5	R5T	Thermistor (Suction pipe2: Ts2)	Used to the calculation of superheat and internal temperature of compressor etc.
6	R6T	Thermistor (Subcooling heat exchanger gas pipe: Tsh)	Used to control of subcooling electronic expansion valve.
7	R7T	Thermistor (Liquid pipe1: Tl1)	Liquid thermistor (internal control), and others.
8	R8T	Thermistor (Liquid pipe2: Tl2)	Liquid thermistor (internal control), and others.

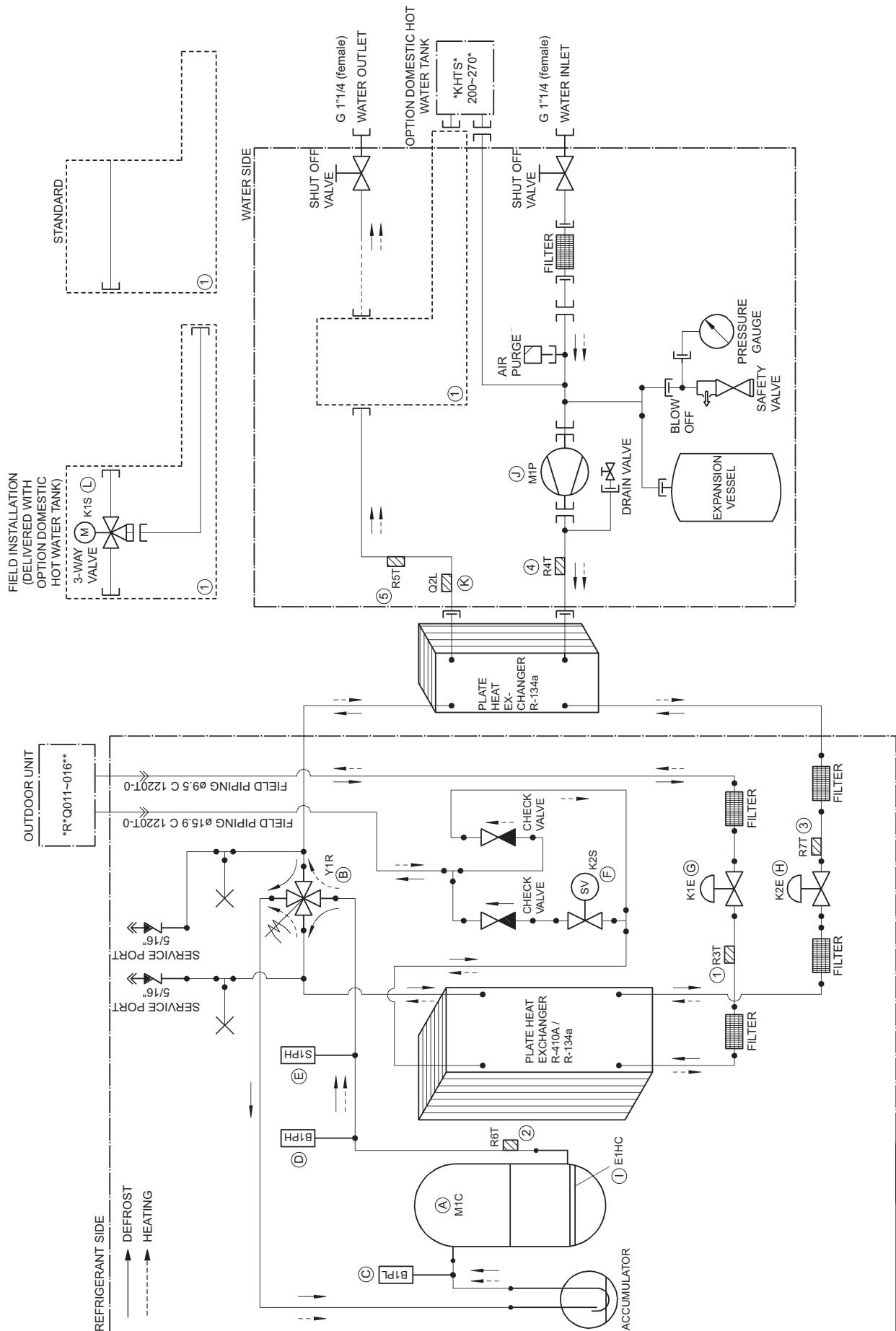


1.2 Indoor Unit

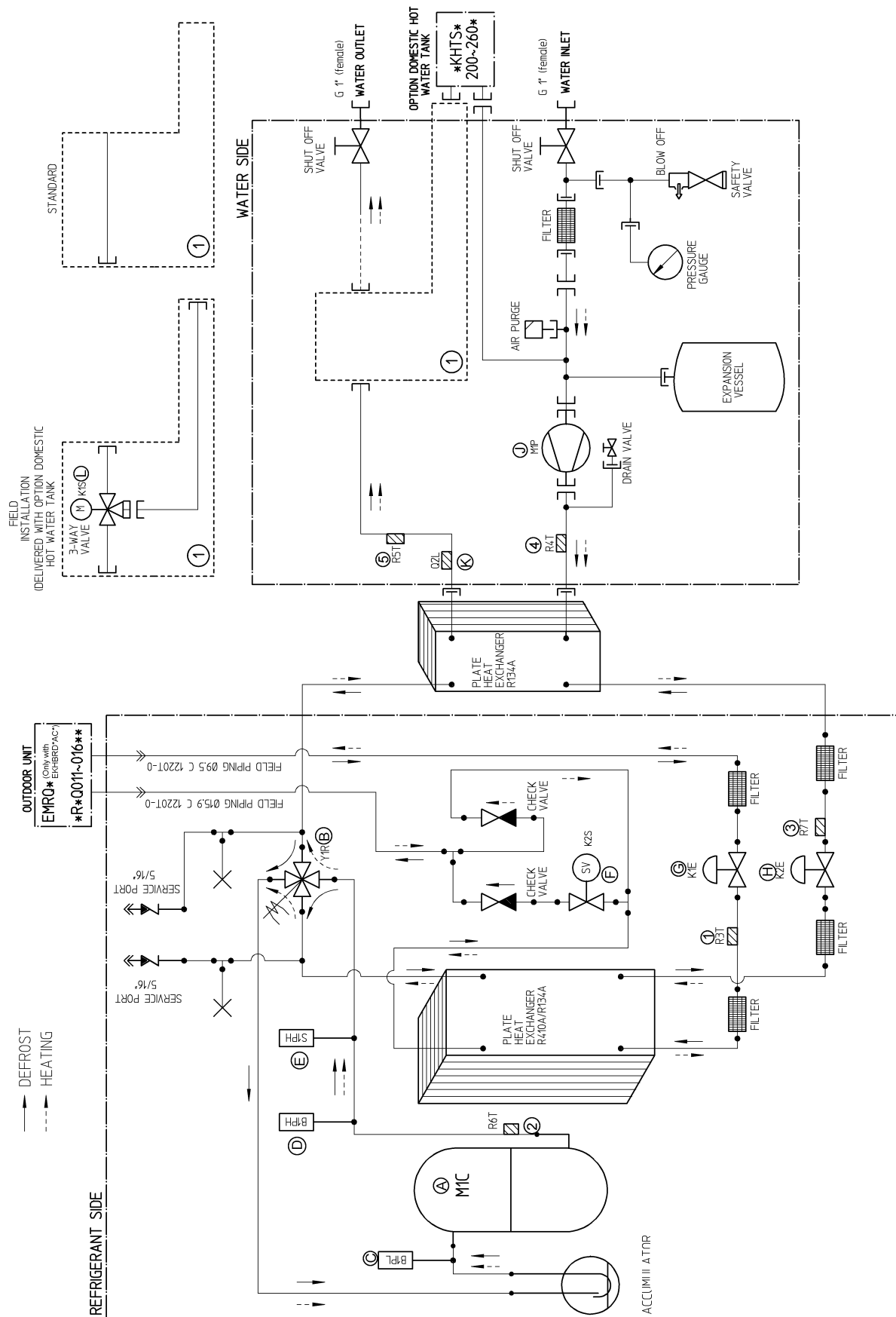
EKHBRD 011/014/016 AA/AB/AC(V1/Y1)

No. in refrigerant system diagram	Symbol	Name	Major Function
A	M1C	Inverter compressor on R-134a	Inverter compressor is operated on frequencies between 40 Hz and 210 Hz by using the inverter. Max. of 30 steps.
B	Y1R	Four way valve	Used to switch the operation mode between heating and defrost. Not activated during heating (opposite concerning outdoor unit).
C	B1PL	Low pressure sensor	Used to detect low pressure.
D	B1PH	High pressure sensor	Used to detect high pressure.
E	S1PH	High pressure switch	In order to prevent the increase of high pressure when a malfunction occurs, this switch is activated at high pressure of 3.8 MPa or more to stop the compressor operation.
F	K2S	2-way valve	Used during defrost operation.
G	K1E	Electronic expansion valve	Used to regulate the refrigerant flow of R-410A.
H	K2E	Electronic expansion valve	Used to regulate the refrigerant flow of R-134a.
I	E1HC	Crankcase heater	Used to prevent migration (when the unit is OFF) and condensation of refrigerant in the crankcase of compressor.
J	M1P	DC inverter pump	Used to regulate water flow to achieve a constant ΔT .
K	Q2L	Thermistor protector water piping	Used to protect the water system against high temperatures.
L	K1S	3 way valve (option for water tank)	Used to switch over between space heating and domestic hot water.
1	R3T	Liquid thermistor R-410A	Subcool calculation.
2	R6T	Discharge thermistor	Used to detect discharge pipe temperature, make the temperature protection control of compressor, and others.
3	R7T	Liquid thermistor R-134a	Subcool calculation.
4	R4T	Returning water thermistor	Used to control and protect the water system.
5	R5T	Leaving water thermistor	Used to control and protect the water system.

EKHBRD 011/014/016 AA(V1/Y1)



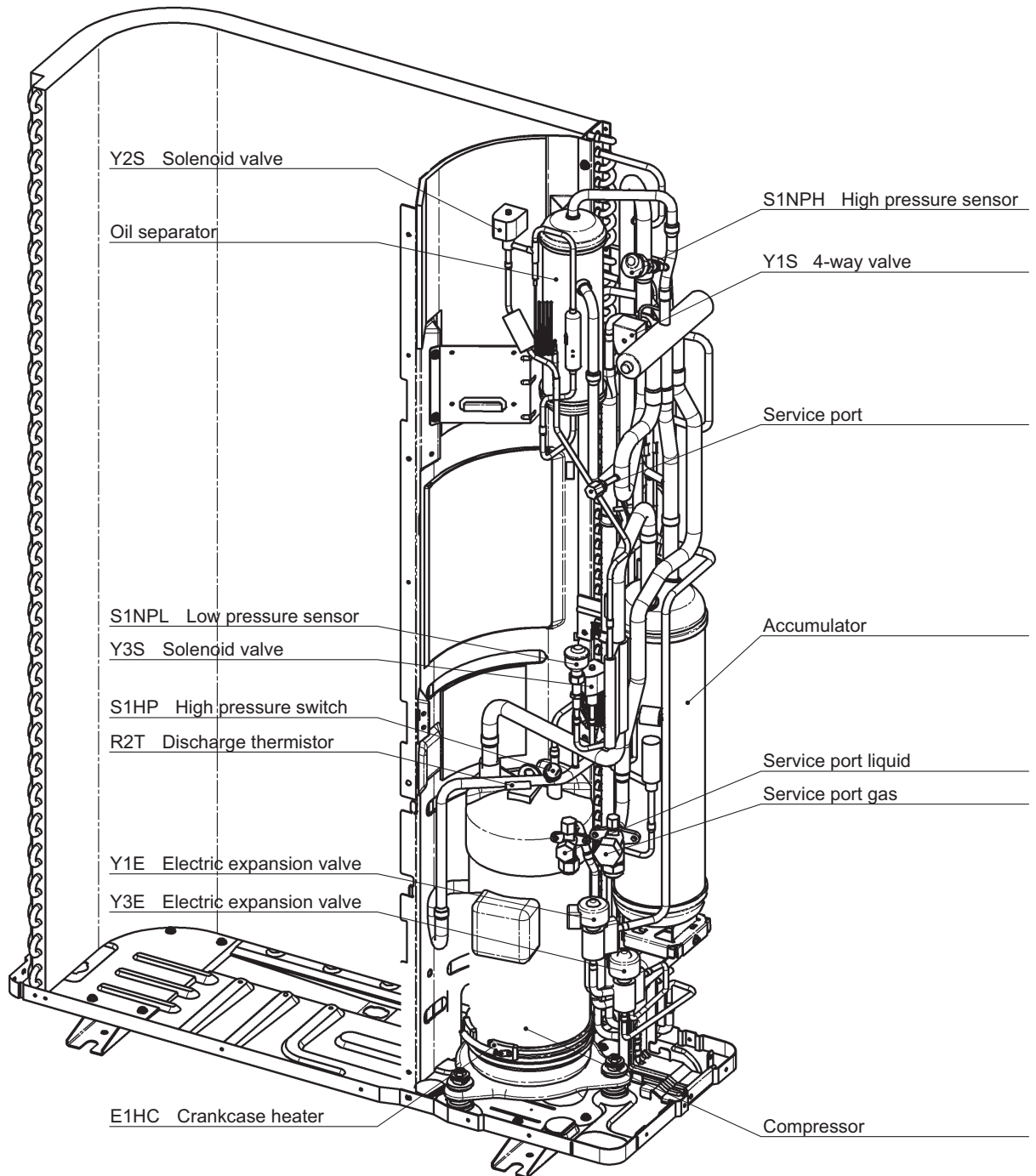
EKHBRD 011/014/016 AB/AC(V1/Y1)



2. Functional Parts Layout

2.1 ERRQ 011/014/016 AAV1, ERSQ 011/014/016 AAV1

Bird's-eye view

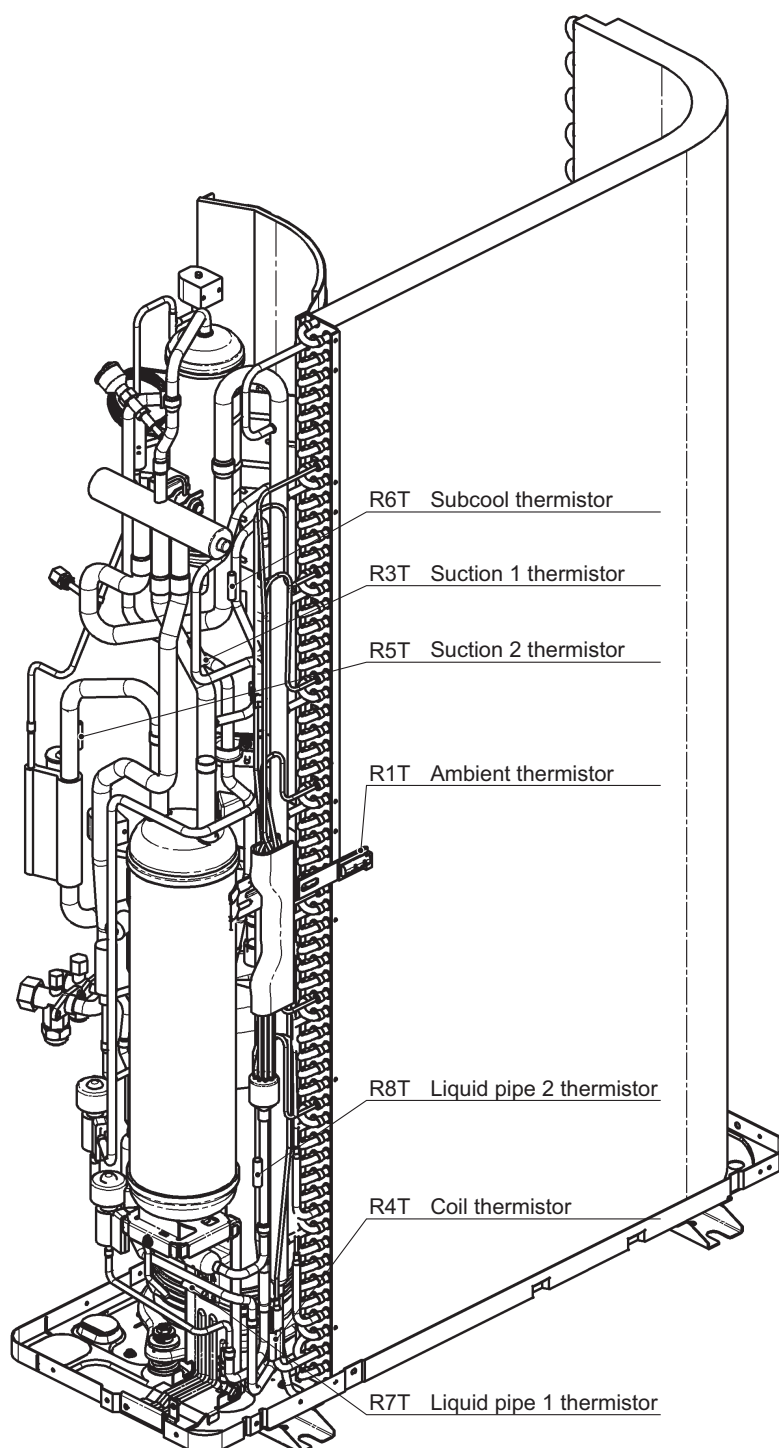


Remark:

Bottom plate heater:

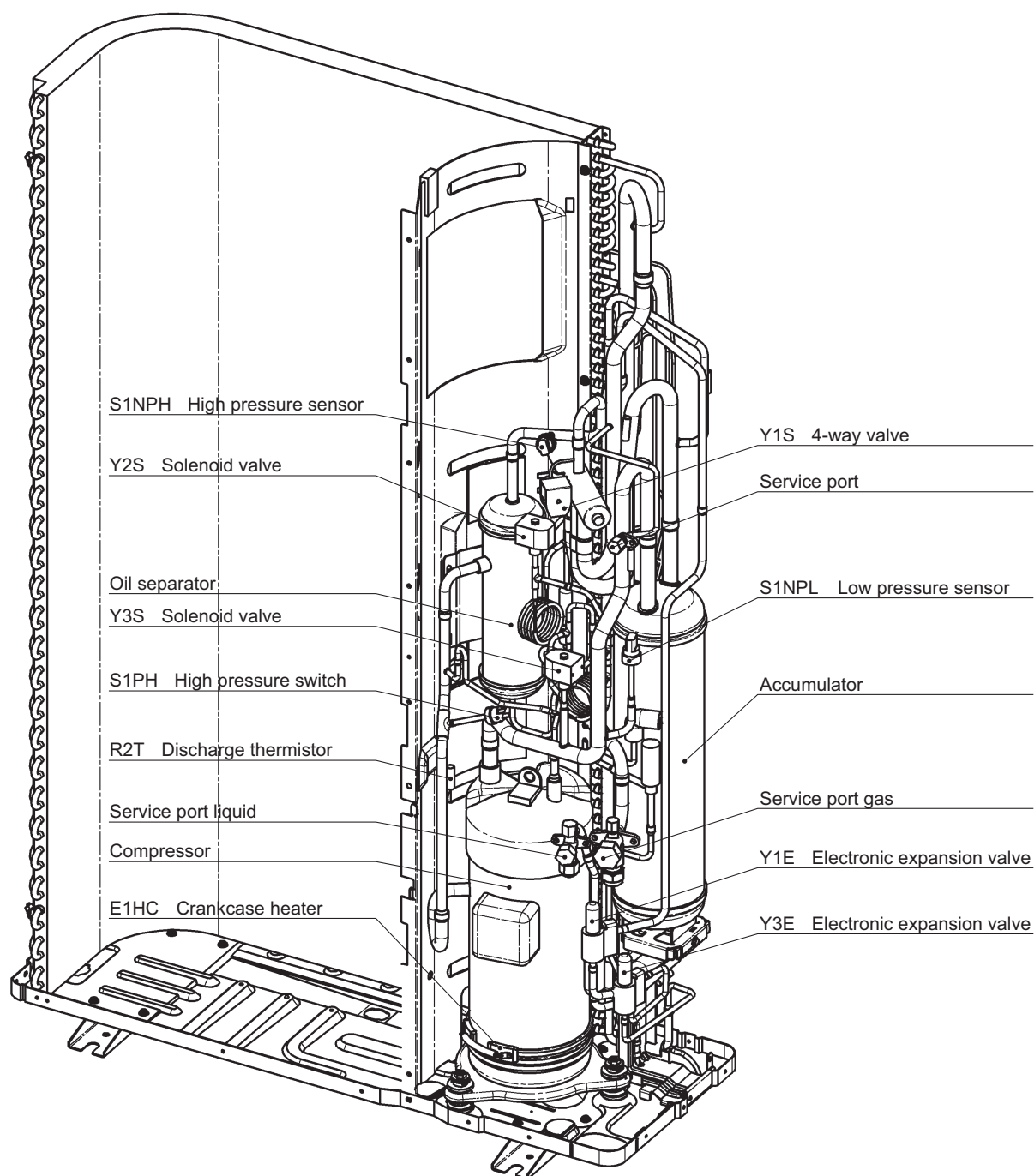
- Standard for ERRQ
- Optional for ERSQ

Back view



2.2 ERRQ 011/014/016 AAY1, ERSQ 011/014/016 AAY1

Bird's-eye view

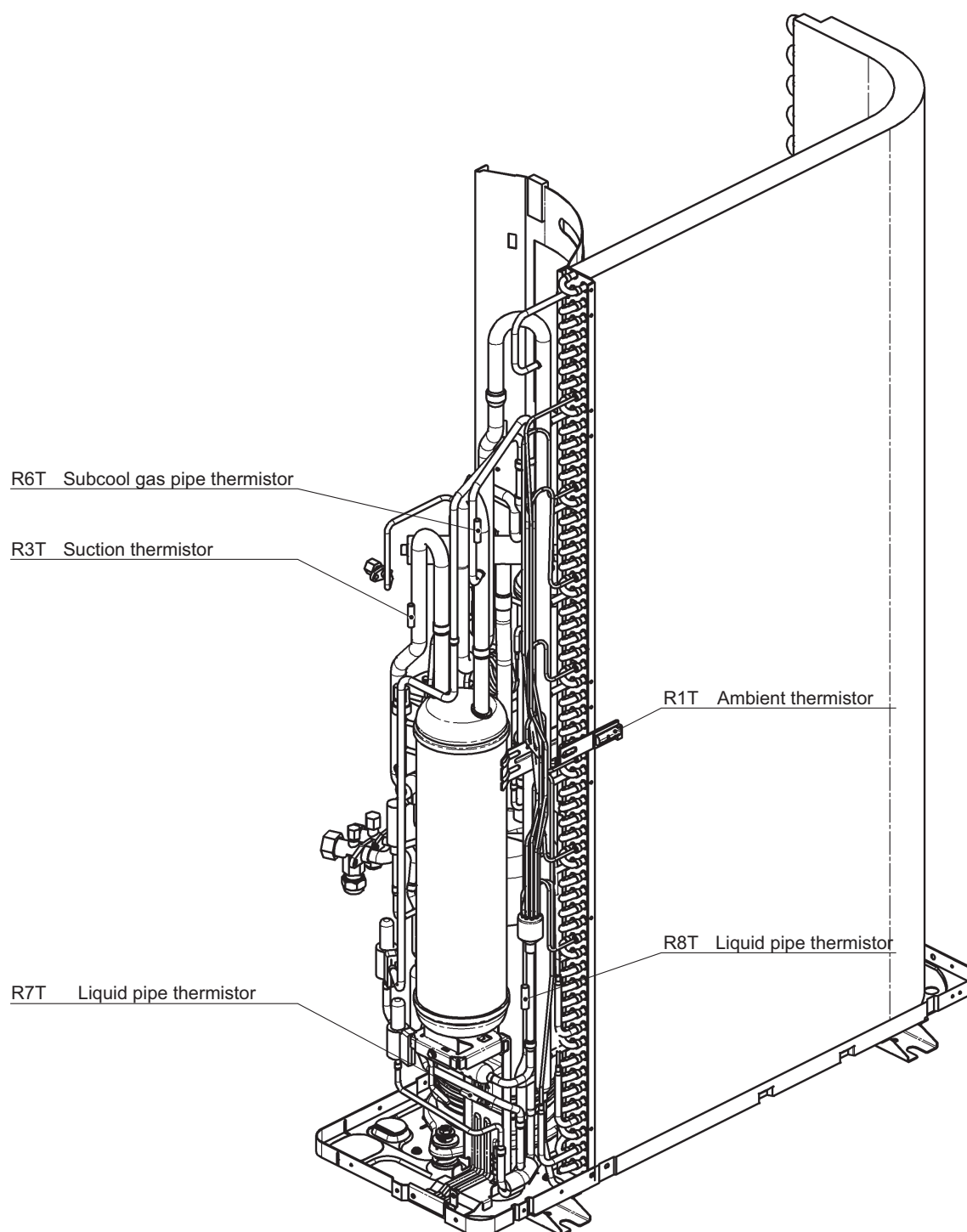


Remark:

Bottom plate heater:

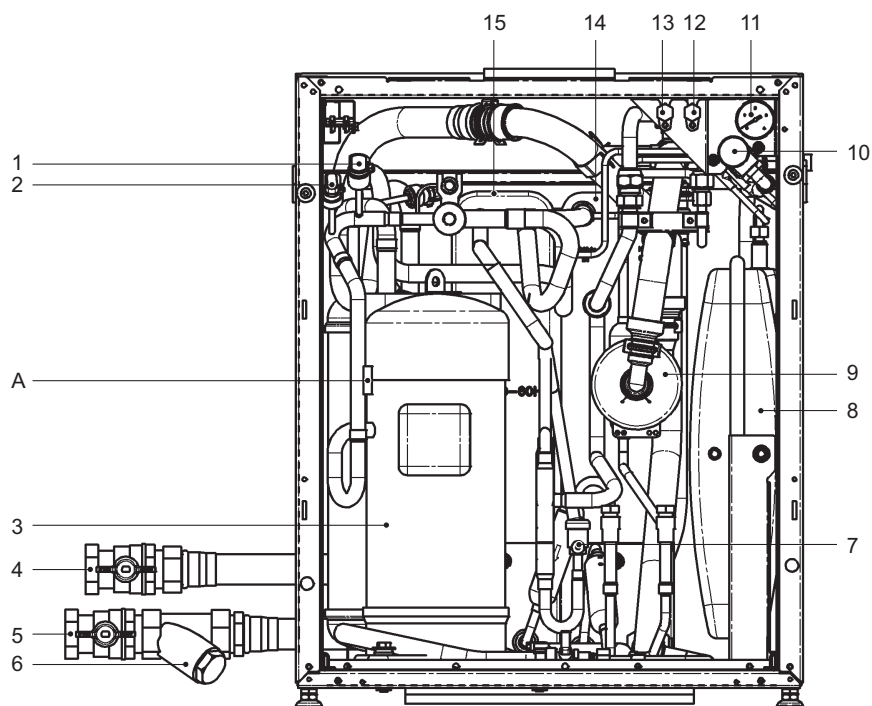
- Standard for ERRQ
- Optional for ERSQ

Back view

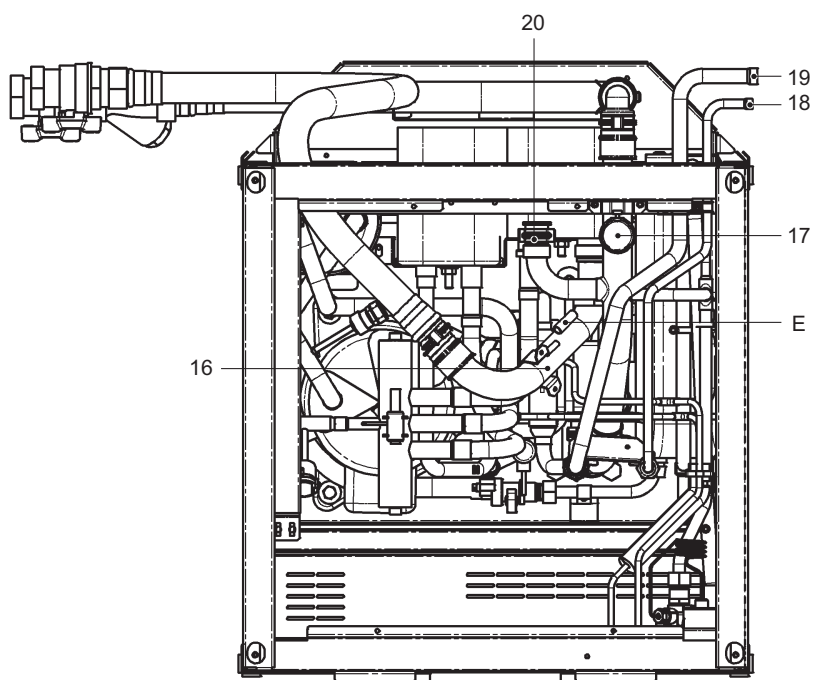


2.3 EKHDRD 011/014/016 AA(V1/Y1)

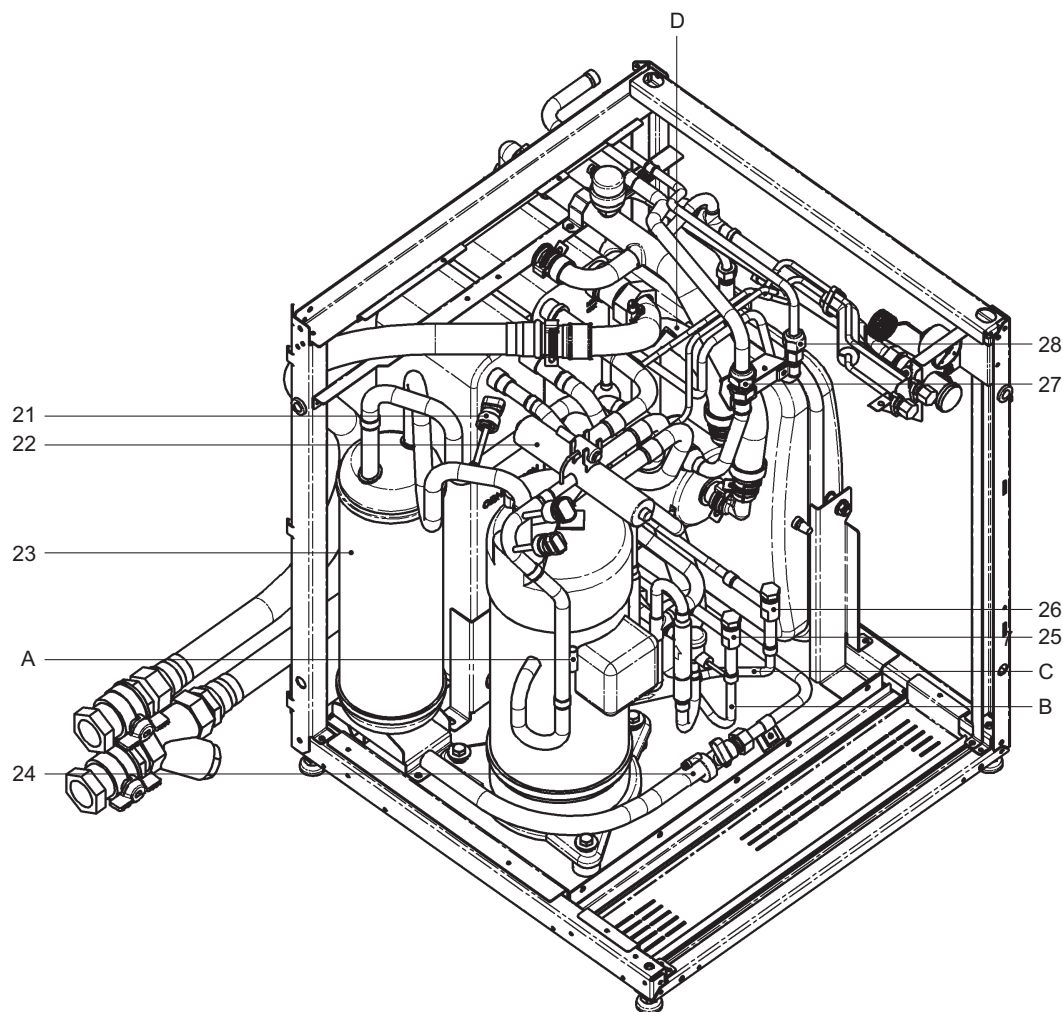
Front view



Top view



Bird's-eye view



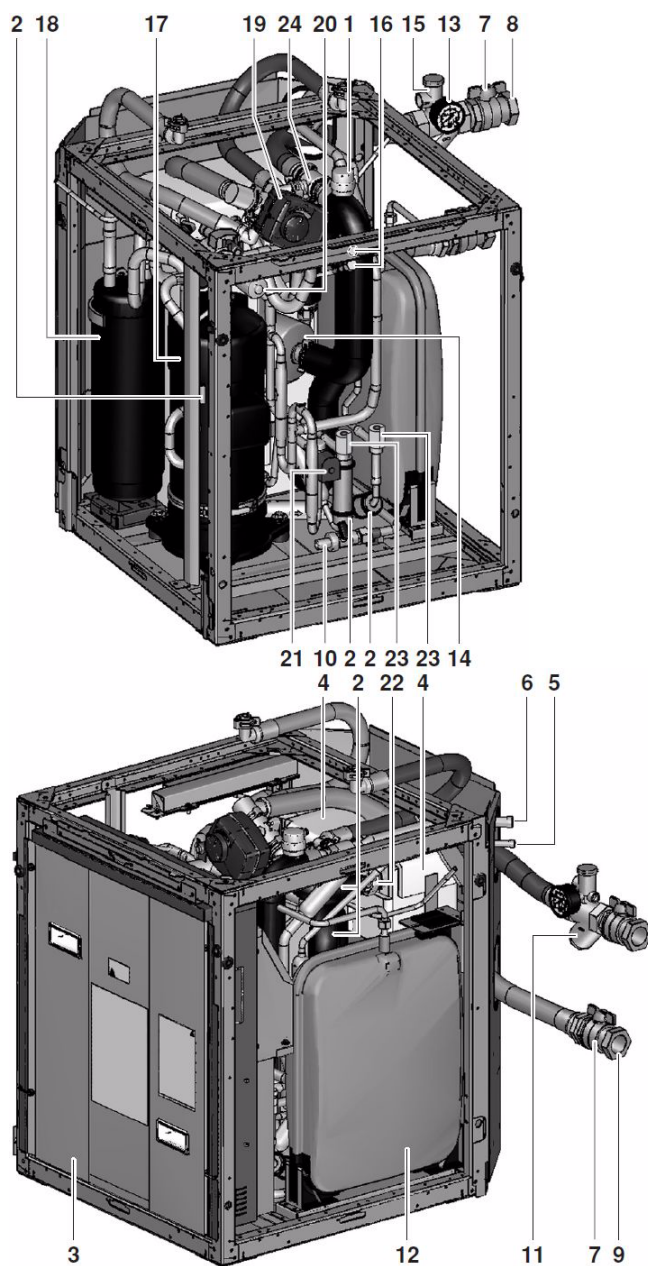
Legend

No.	Name
1	High pressure sensor
2	High pressure switch
3	Compressor R-134a
4	Outlet water connection
5	Inlet water connection
6	Filter
7	Solenoid valve
8	Expansion vessel 12 l
9	DC inverter pump
10	Pressure relief valve
11	Manometer
12	High pressure service port R-134a
13	Low pressure service port R-134a
14	Heat exchanger: refrigerant - water
15	Heat exchanger: refrigerant - refrigerant
16	(Q2L) Thermal protector water piping
17	Air purge valve

No.	Name
18	Refrigerant liquid connection R-410A
19	Refrigerant gas connection R-410A
20	Return water connection from tank
21	Low pressure sensor
22	4-way valve (R-134a)
23	Accumulator R-134a
24	Drain
25	Electronic expansion valve R-134a
26	Electronic expansion valve R-410A
27	Refrigerant gas connection R-410A
28	Refrigerant liquid connection R-410A
A	R6T Discharge thermistor
B	R7T Liquid thermistor R-134a
C	R3T Liquid thermistor R-410A
D	R4T Returning water thermistor
E	R5T Leaving water thermistor

2.4 EKHDRD 011/014/016 AB/AC(V1/Y1)

Overview



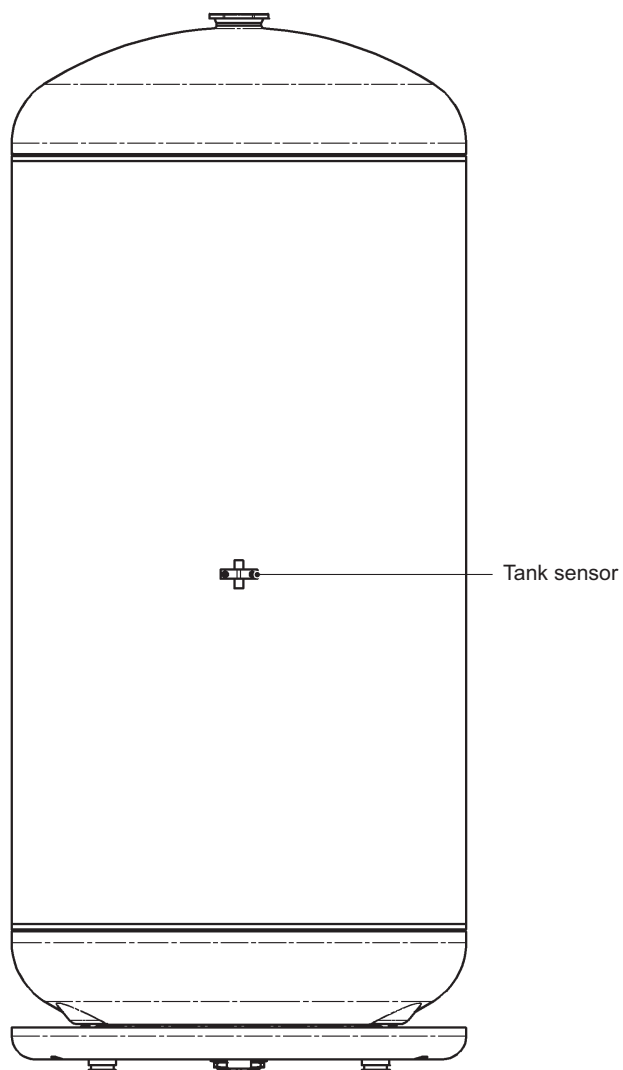
Legend

No.	Name
1	Air purge valve
2	Thermistors
3	Switchbox
4	Heat exchangers
5	Refrigerant liquid connection R410A
6	Refrigerant gas connection R410A
7	Shut-off valves
8	Water inlet connection
9	Water outlet connection
10	Drain valve
11	Water filter
12	Expansion vessel (12l)

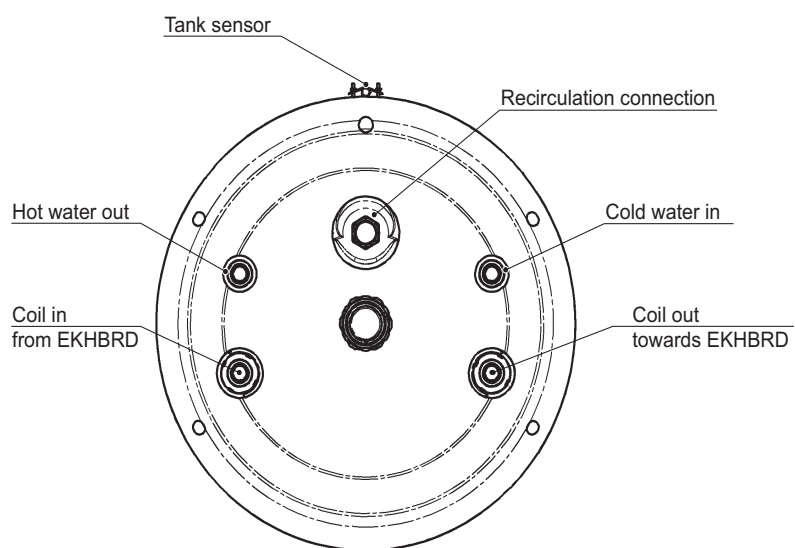
No.	Name
13	Manometer
14	Pump
15	Pressure relieve valve
16	Service ports R134a
17	Compressor R-134a
18	Accumulator
19	3-way valve (option, with EKHTS tank))
20	4-way valve
21	2-way valve
22	Thermal cut-out
23	Electronic expansion valve
24	T-piece (option, with EKHTS tank)

2.5 EKHTS 200/260 A/AB/AC

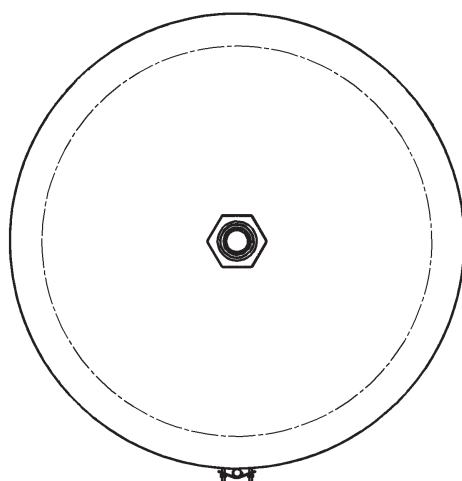
Front view



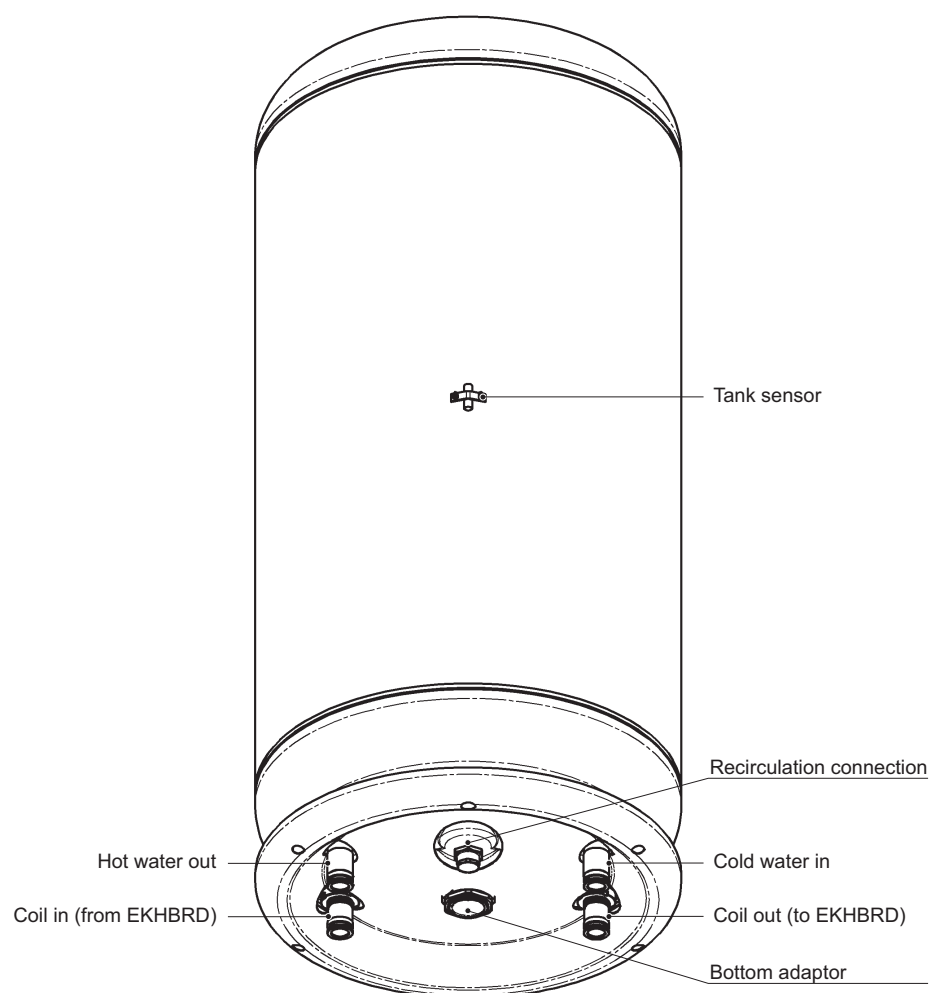
Bottom view



Top view

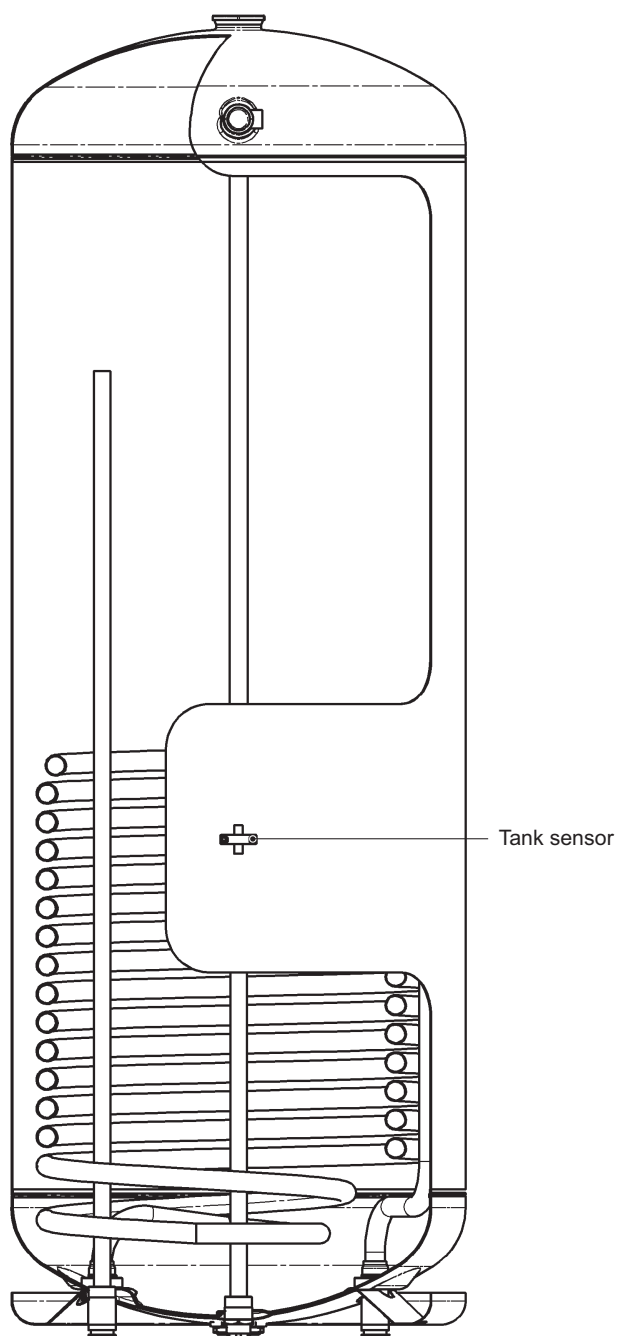


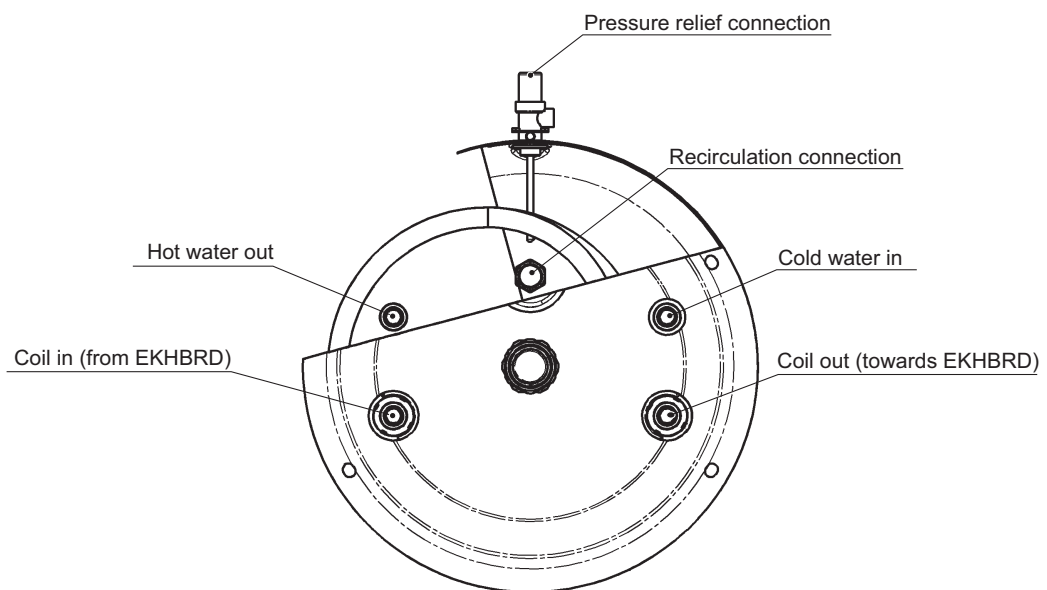
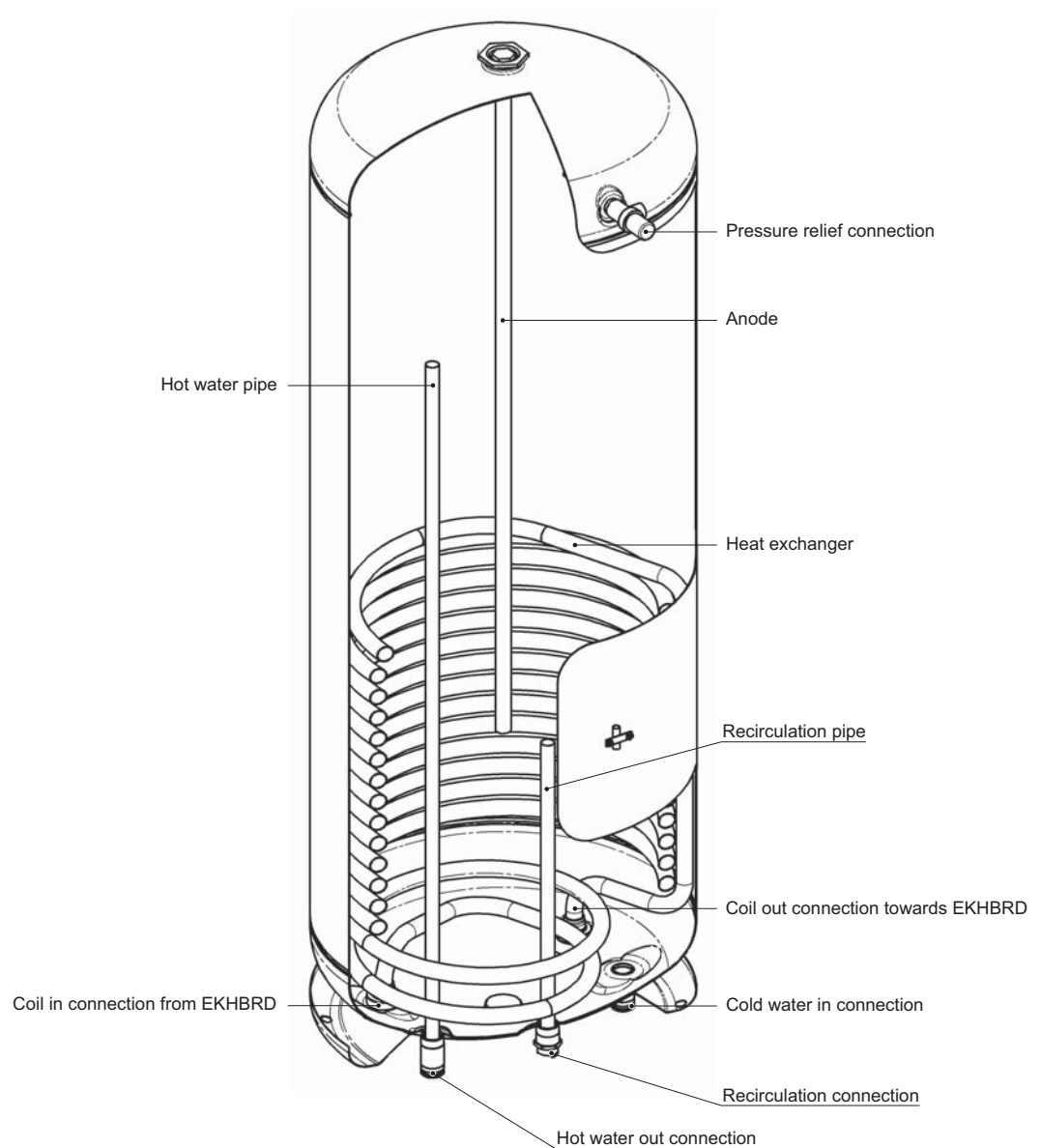
Worm's-eye view



2.6 EKHTSU 200/260 A/AB/AC

Front view



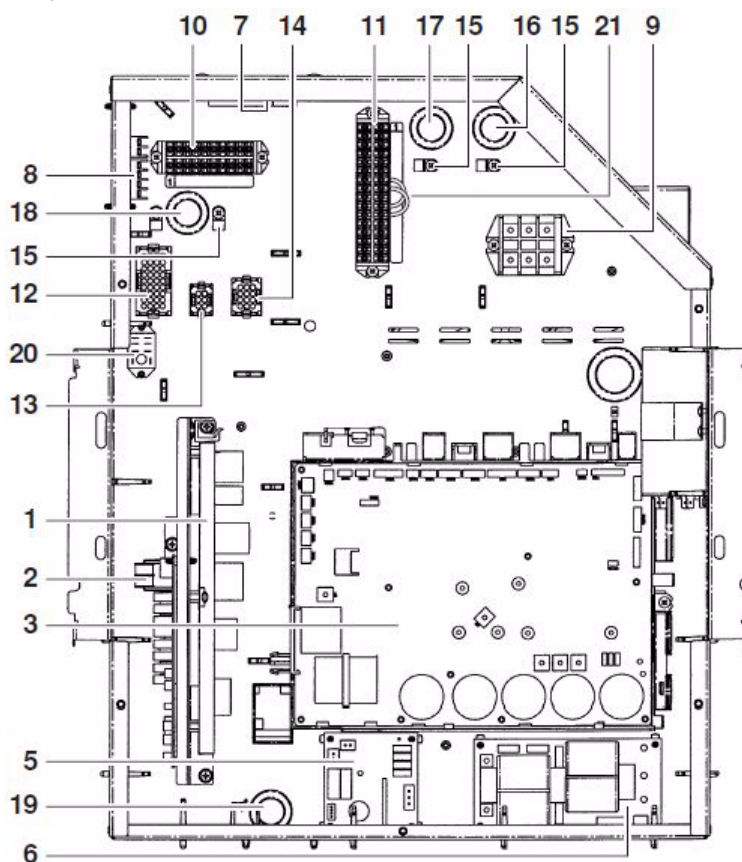
Bottom view**Bird's-eye view**

Part 4 - Electrical Circuit

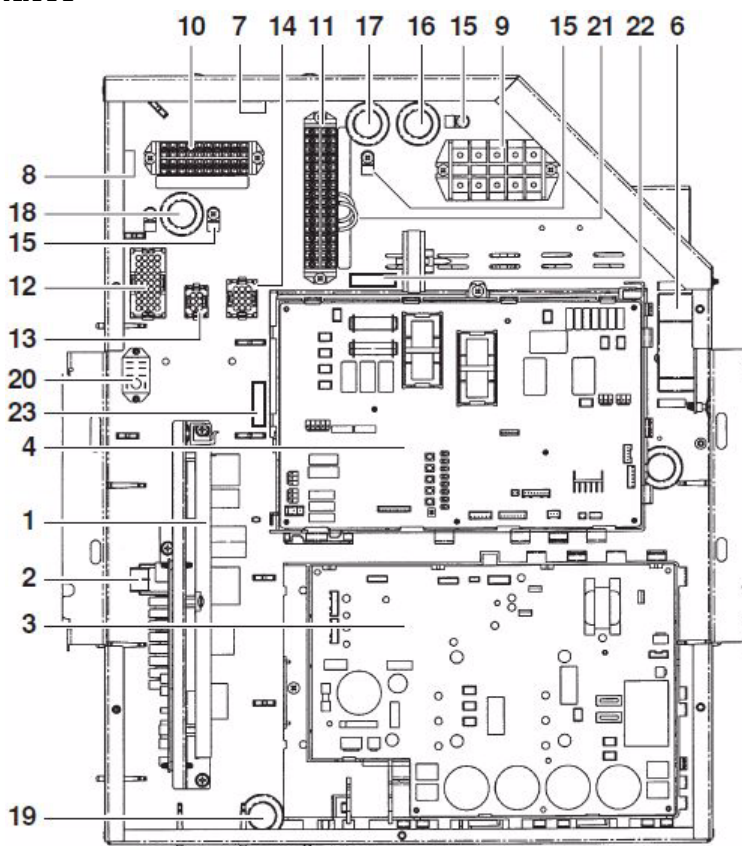
1. Switch Box Layout - Indoor Unit EKHBRD	30
2. PCB Layout for EKHBRD 011/014/016 AA/AB/AC V1/Y1	34
2.1 Main PCB - A1P	34
2.2 Control - PCB - A3P	36
2.3 Inverter PCB - A4P	38
2.4 Filter PCB - A6P	41
2.5 QA PCB - A5P	43
2.6 Inverter Control PCB - Three Phase - A4P	44
2.7 Inverter PCB - Three Phase - A5P	46
2.8 Digital I/O PCB (Option PCB A7P)	48
2.9 Demand PCB (Option PCB A8P)	50

1. Switch Box Layout - Indoor Unit EKHBRD

EKHBRD 011/014/016 AAV1

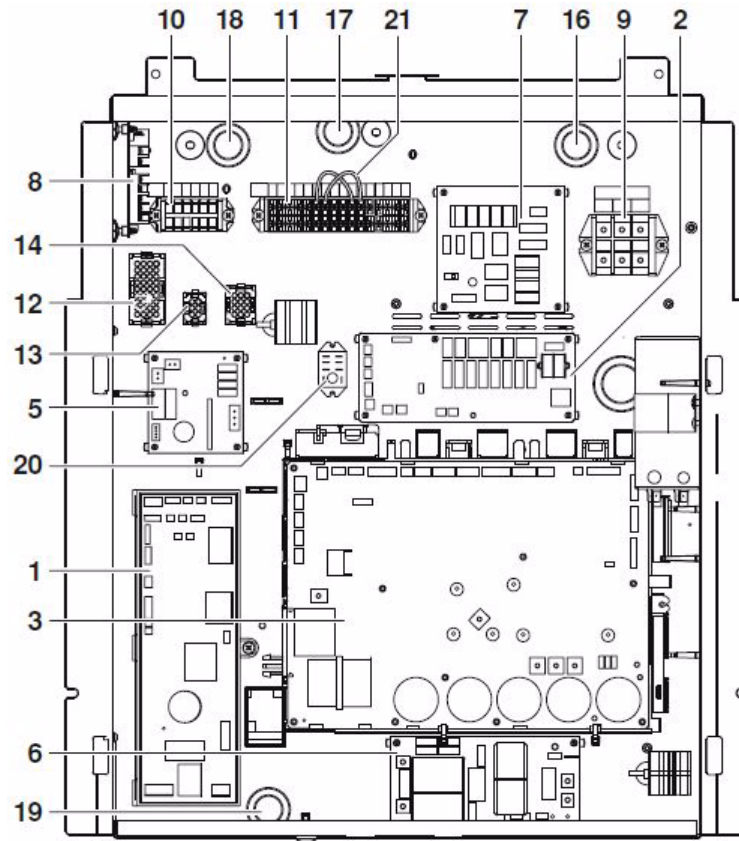
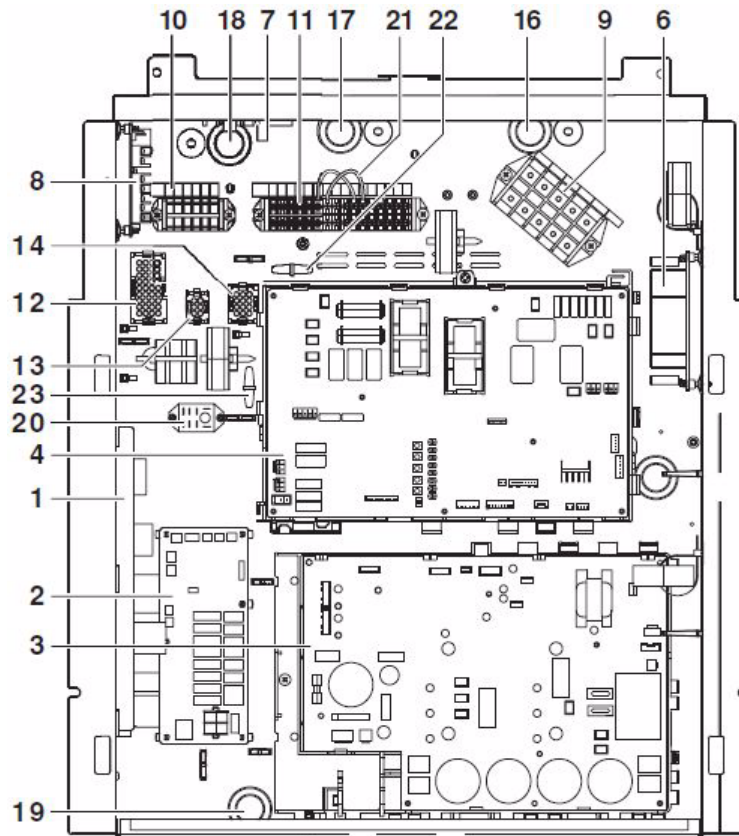


EKHBRD 011/014/016 AAY1



Legend

No.	Name
1	Main PCB (A1P)
2	Control PCB (A3P)
3	Inverter PCB (A5P)
4	Inverter control PCB (A4P) (only Y1)
5	QA PCB (A5P) (only V1)
6	Filter PCB (A6P)
7	Digital I/O PCB (A7P) (Optional)
8	Demand PCB (A8P) (Optional)
9	Terminal block X1M: Main power supply
10	Terminal block X2M: AC connections
11	Terminal block X3M: DC connections
12	DC connector X1Y
13	Pump connector X2Y
14	AC connectory X3Y
15	Cable tie mountings
16	Power wiring entry
17	AC field wiring entry
18	DC field wiring entry
19	Compressor cable entry
20	Interface relay K1A
21	Wiring bridges
22	Fuse F1 (Only Y1)
23	Fuse F2 (Only Y1)

EKHBRD 011/014/016 AB/AC V1**EKHBRD 011/014/016 AB/AC Y1**

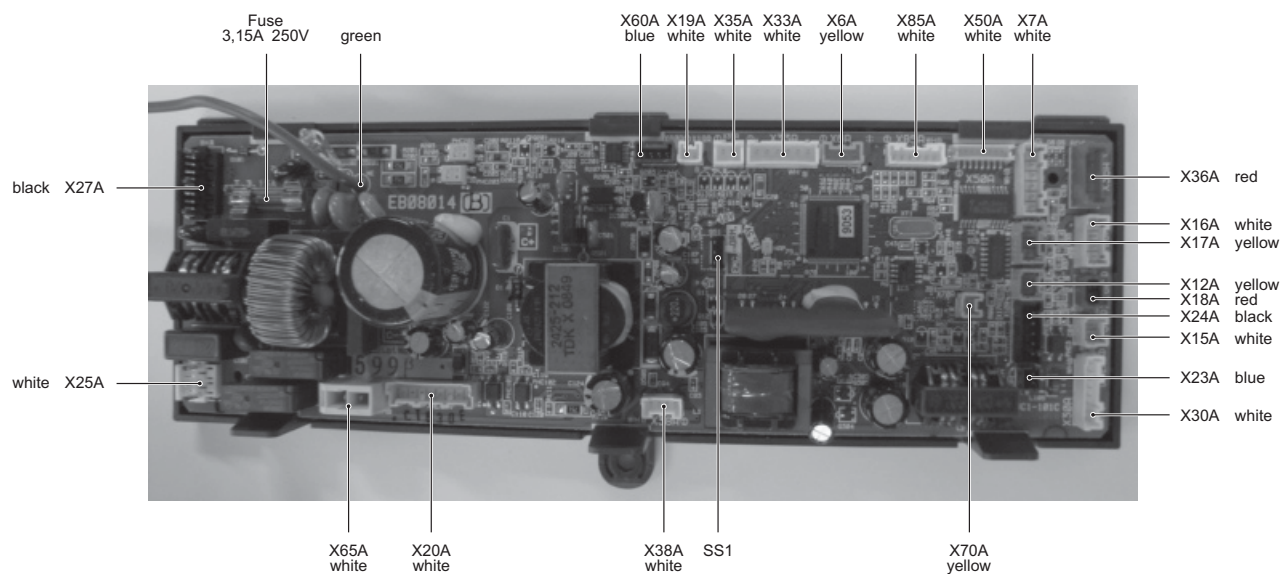
Legend

No.	Name
1	Main PCB (A1P)
2	Control PCB (A3P)
3	Inverter PCB (A5P)
4	Inverter control PCB (A4P) (only Y1)
5	QA PCB (A5P) (only V1)
6	Filter PCB (A6P)
7	Digital I/O PCB (A7P) (Optional)
8	Demand PCB (A8P) (Optional)
9	Terminal block X1M: Main power supply
10	Terminal block X3M: DC connections
11	Terminal block X2M: AC connections
12	DC connector X1Y
13	Pump connector X2Y
14	AC connectory X3Y
15	Cable tie mountings
16	Power wiring entry
17	AC field wiring entry
18	DC field wiring entry
19	Compressor cable entry
20	Interface relay K1A
21	Wiring bridges
22	Fuse F1 (Only Y1)
23	Fuse F2 (Only Y1)

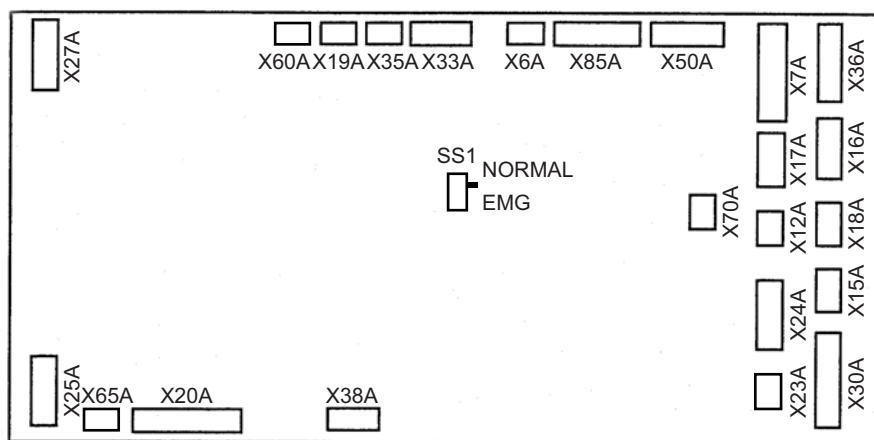
2. PCB Layout for EKHB RD 011/014/016 AA/AB/AC V1/Y1

2.1 Main PCB - A1P

Main PCB - single phase



Main PCB - A1P



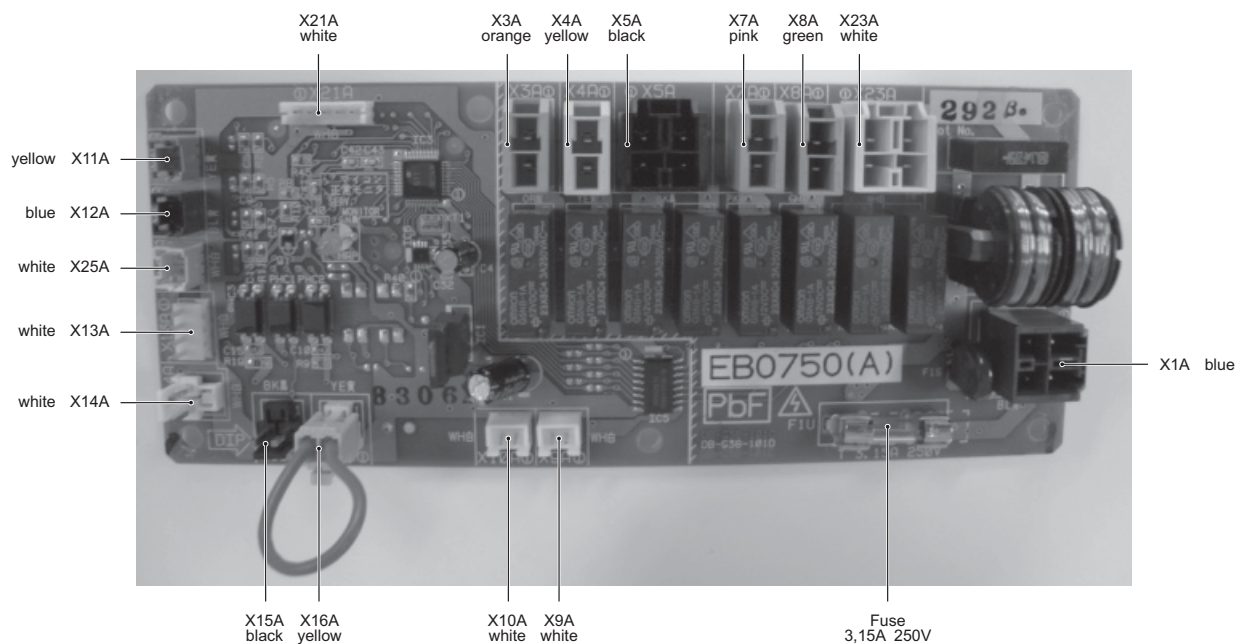
Legend

Connector	Connected to	Color
SS1	Emergency switch	
X6A	-	Yellow
X7A	K1E: electronic expansion valve	White
X12A	R4T: returning water thermistor	Yellow
X15A	-	White
X16A	-	White
X17A	R5T: leaving water thermistor	Yellow
X18A	R3T: liquid thermistor R-410A	Red
X19A	-	White
X20A	M1P: DC inverter pump	White
X23A	-	Blue
X24A	-	Black
X25A	-	White
X27A	X803A of PCB A5P	Black
X30A	X3M [3; 4 -> F ₁ F ₂] [7; 8 -> P ₁ P ₂]	White
X33A	X2A of PCB A7P*	White
X35A	X10A of PCB A3P	White
X36A	-	Red
X38A	-	White
X50A	-	White
X60A	-	Blue
X65A	-	White
X70A	X15A of PCB A3P	Yellow
X85A	X80A of PCB A8P*	White

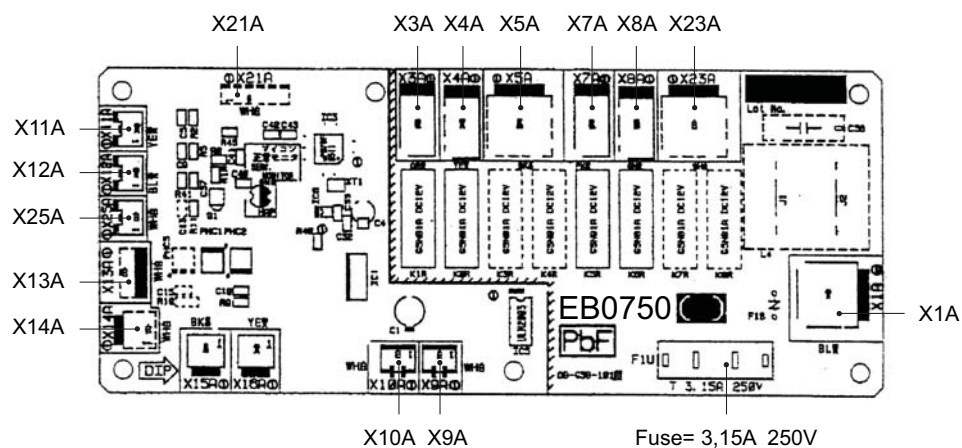
*: A7P, A8P= option PCB; connection not standard

2.2 Control - PCB - A3P

Control PCB - single phase



Control PCB - A3P



Legend

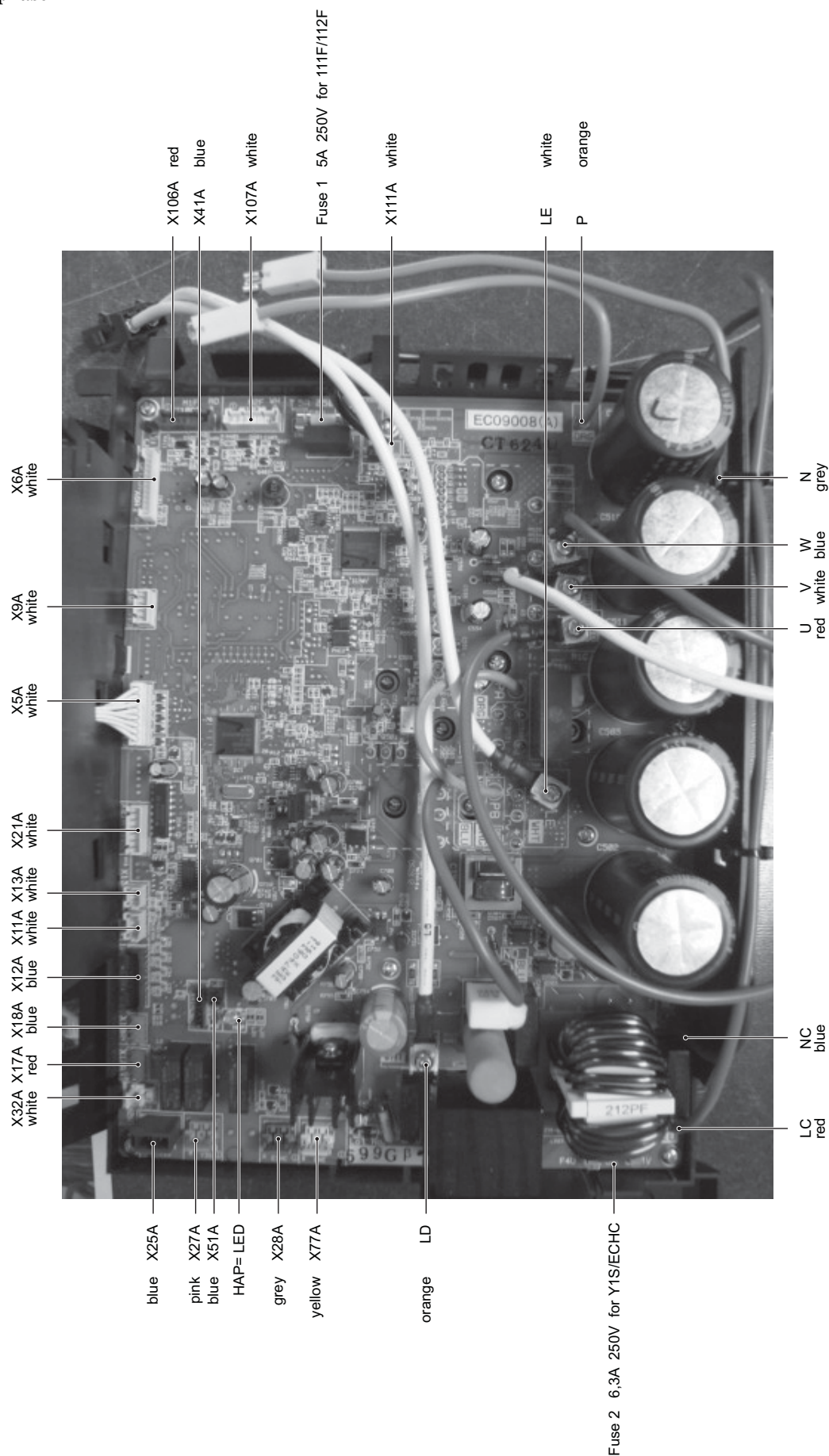
Connector	Color	Connected to
X1A	Blue	-
X3A	Orange	X2M [12 - 13]
X4A	Yellow	-
X5A	Black	X2M [3 - 4]
X7A	Pink	2-way valve (R-410A)
X8A	Green	Bridge with filter capacitors
X9A	White	-
X10A	White	X35A of PCB A1P -> 16V power supply
X11A	Yellow	R2T ^{*1}
X12A	Blue	-
X13A	White	-
X14A	White	X3M [7 - 8] ^{*2}
X15A	Black	X15A of PCB A1P
X16A	Yellow	Bridge
X21A	White	-
X23A	White	X2M [14 - 15 -16]
X25A	White	-

*1: Only for EKHTS

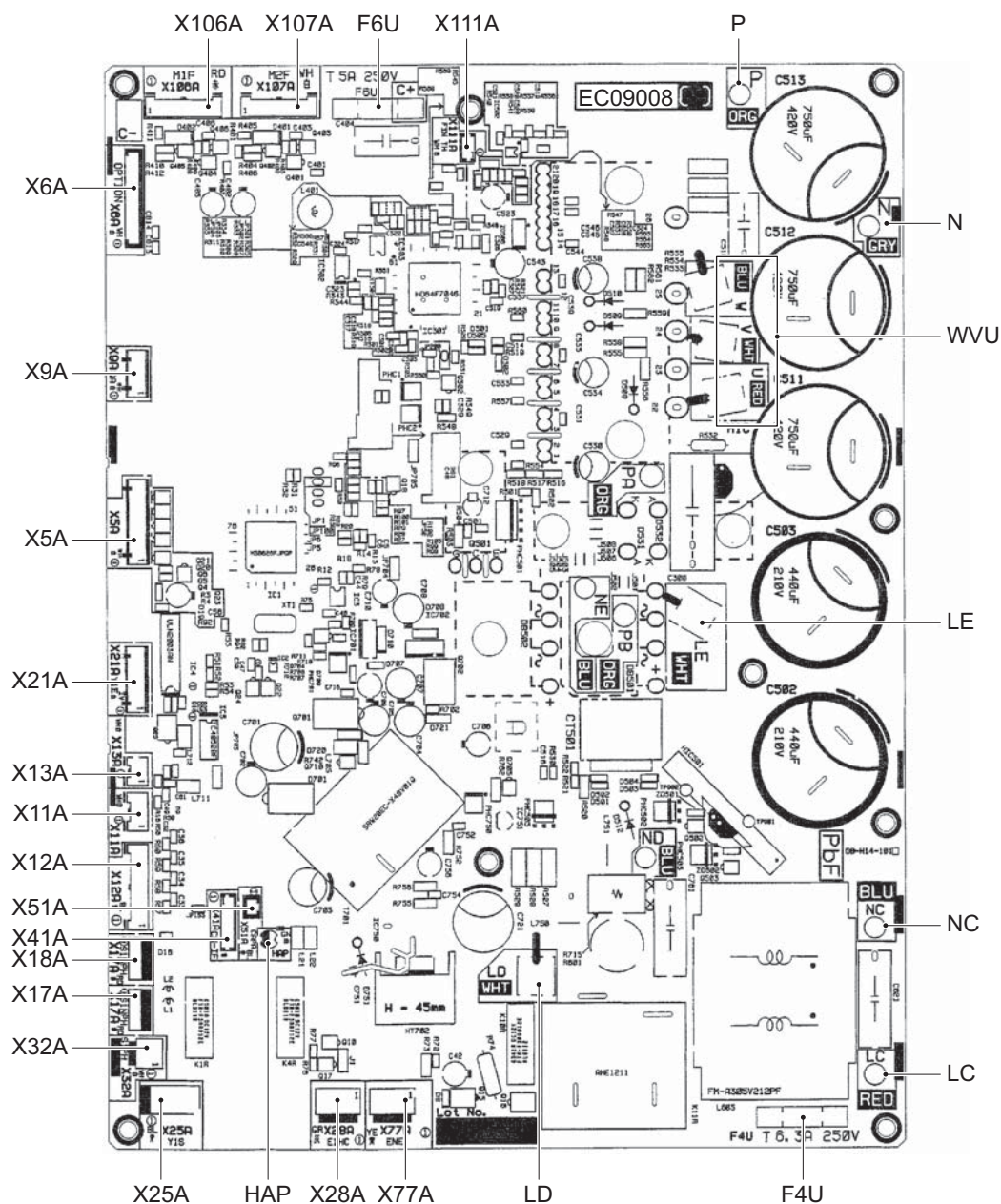
*2: Only for benefit kWh rate power supply installation

2.3 Inverter PCB - A4P

Inverter PCB - single phase



Inverter PCB



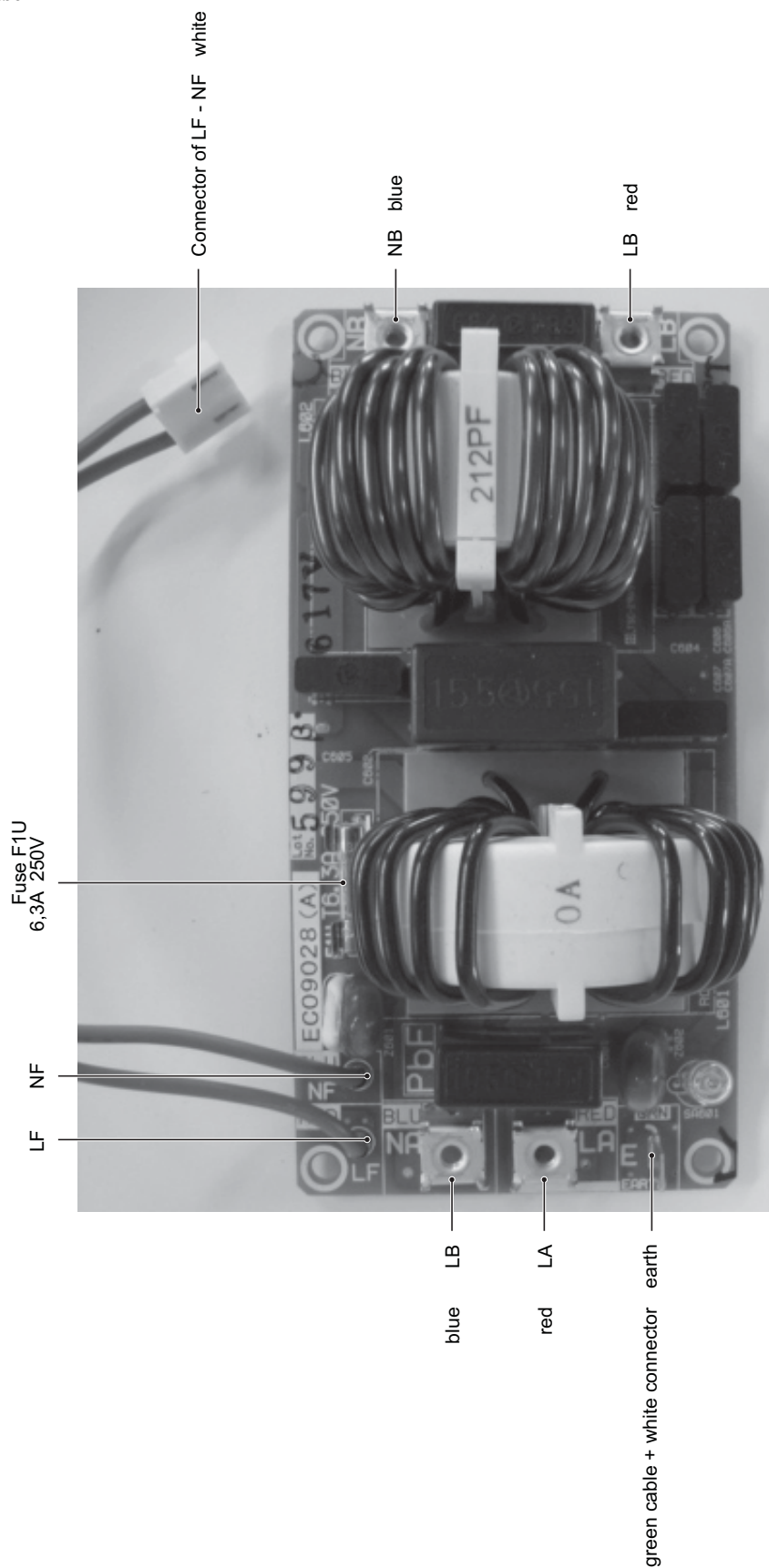
Legend

Connector	Color	Connected to	Function
X5A	White	-	-
X6A	White	-	-
X9A	White	X809A of PCB A5P	QA PCB
X11A	White	-	-
X12A	Blue	R6T by connector X1Y [13, 14] R7T by connector X1Y [15, 16]	Discharge & liquid [R-134a] thermistor
X13A	White	-	-
X17A	Red	B1PH by connector X1Y [17, 18, 19]	High pressure sensor
X18A	Blue	B1PL by connector X1Y [20 - 21 - 22]	Low pressure sensor
X21A	White	K2E by connector X1Y [25 - 26 - 27 - 28 - 29 - 30]	Electronic expansion valve
X25A	Blue	Y1R by connector X3Y [7 - 8]	4-way valve
X27A	Pink	M1F & M2F	Switch box cooling fan
X28A	Grey	E1HC by connector X3Y [5 - 6]	Crankcase heater
X32A	White	K1A	Interface relay of S1PH & Q2L
X41A	Blue	-	Service purpose

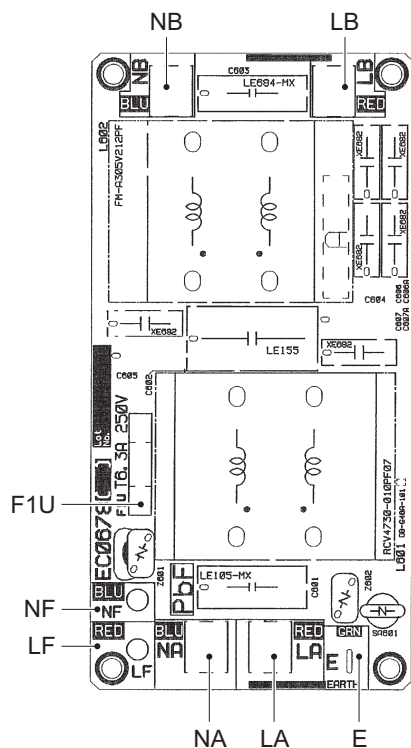
X51A	Blue	-	-
X77A	Yellow	K1A & connector X3Y [9, 10]	Interface relay of S1PH & Q2L
X106A	Red	-	-
X107A	White	-	-
X111A	White	R8T	Fin thermistor
HAP	LED	-	Indication power supply
Fuse 1	-	-	5A, 250V for M1F, M2F
Fuse 2	-	-	6,3A, 250V for Y1S, ECHC
LC	Red	LB of PCB A6P	Filter PCB
LD	Orange	R1L by connector X4Y [1, 2]	Reactor
LE	White		
NC	Blue	NB of PCB A6P	-
N	Grey	C1-	Capacitor C1
P	Orange	C1+	
U	Red	U of M1C	Compressor
V	White	V of M1C	
W	Blue	W of M1C	

2.4 Filter PCB - A6P

Filter PCB - single phase



Filter PCB - A6P

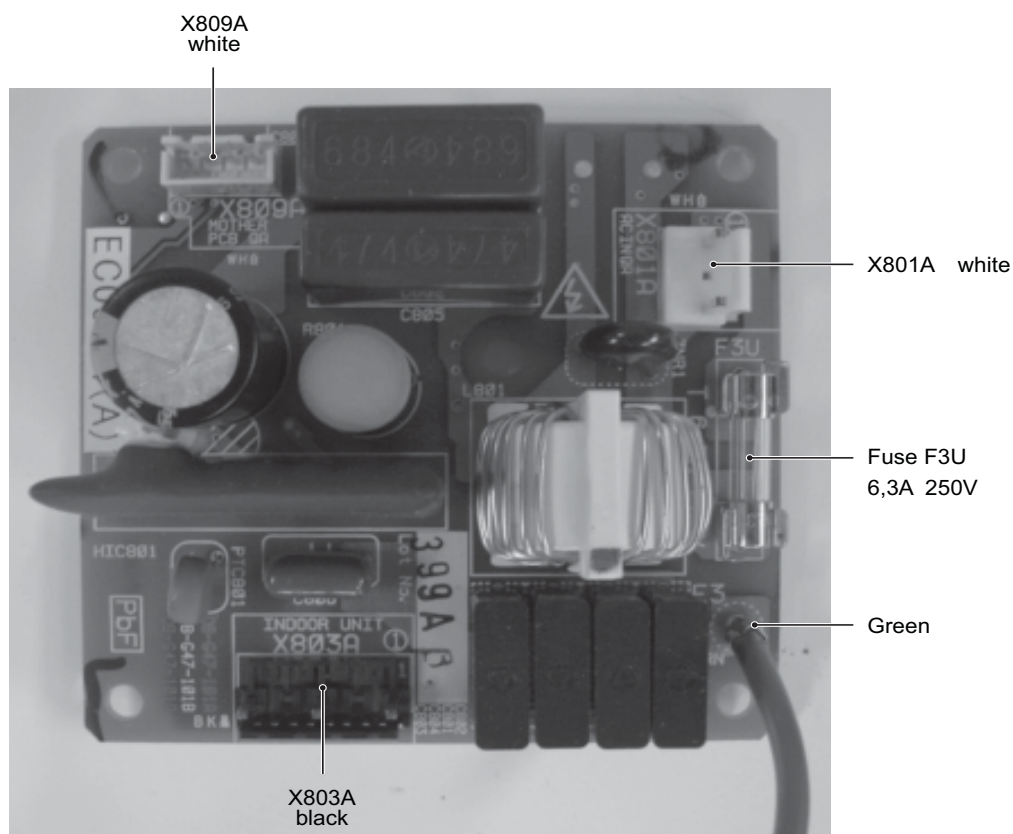


Legend

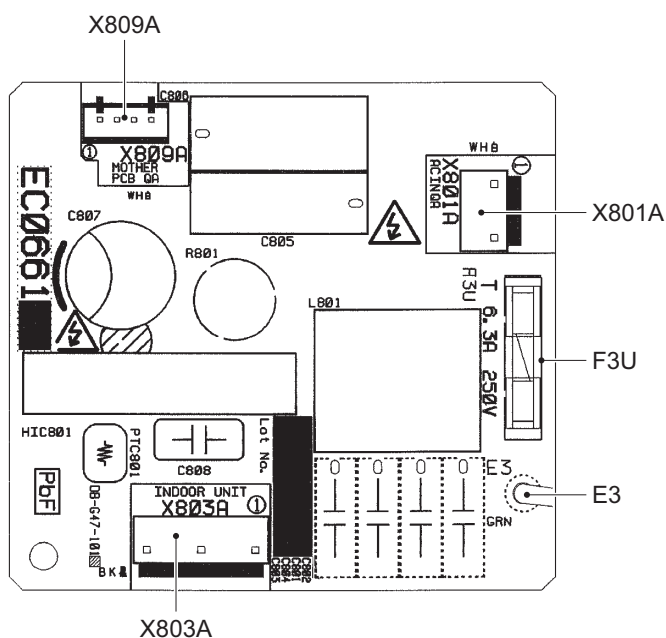
Connector	Color	Connected to - function
LA	Red	X1M [L - N] Power supply 1~230V
NA	Blue	
LB	Red	LC - NC Inverter PCB
NB	Blue	
LF	Red	X2M [10 - 11] via V5C
NF	Blue	
E	Green cable, white connector	Earth
F1U	-	6,3A 250V [fuse]

2.5 QA PCB - A5P

QA PCB - single phase



QA PCB - A5P

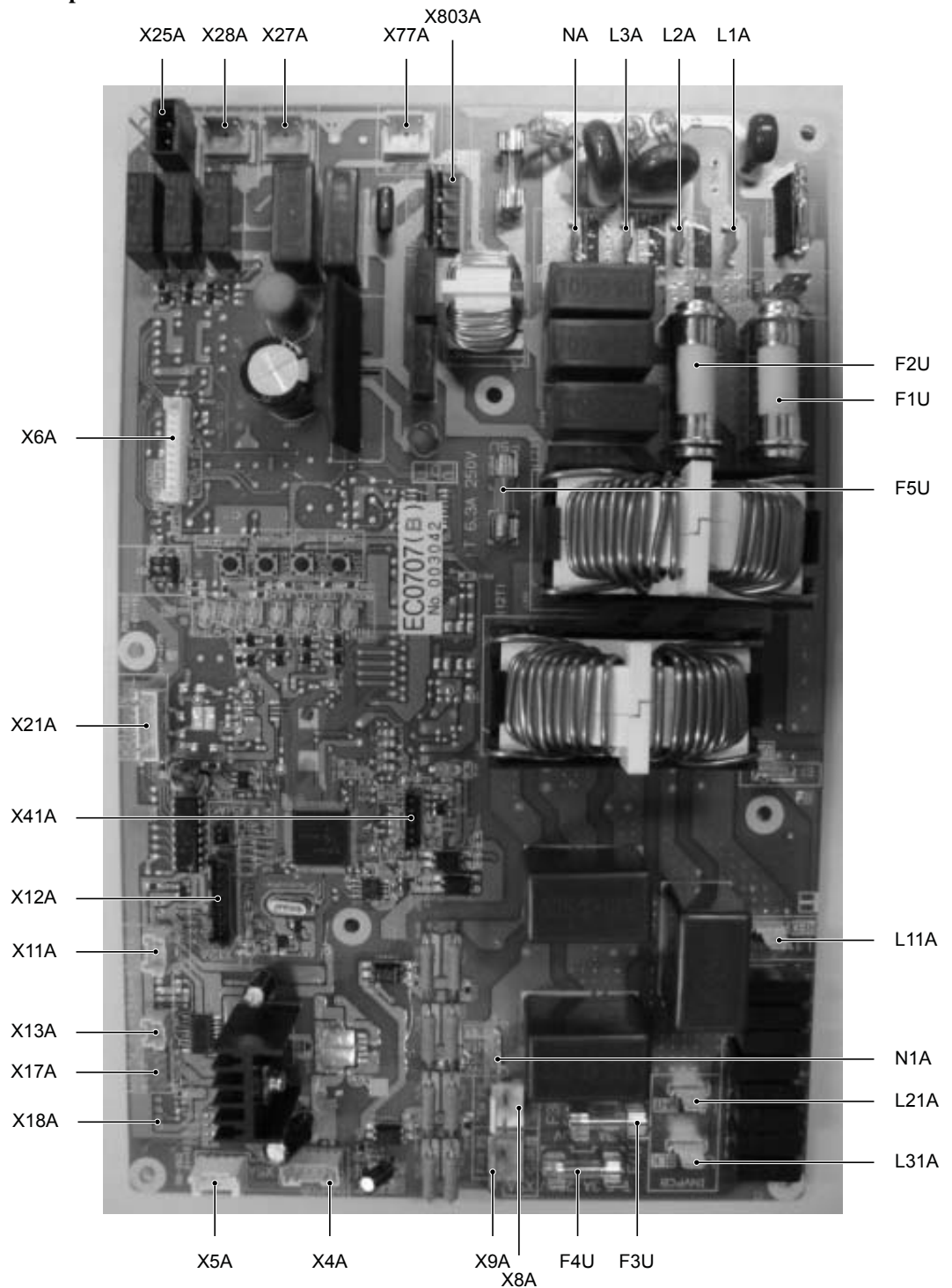


Legend

Connector	Color	Connected to - function
X801A	White	X2M [8 - 9] by V5C
X803A	Black	X27A of main PCB A1P
X809A	White	X9A of inverter PCB A4P
F3U	-	Fuse 6,3A / 250V
E3	Green	Earth

2.6 Inverter Control PCB - Three Phase - A4P

Inverter control PCB - three phase

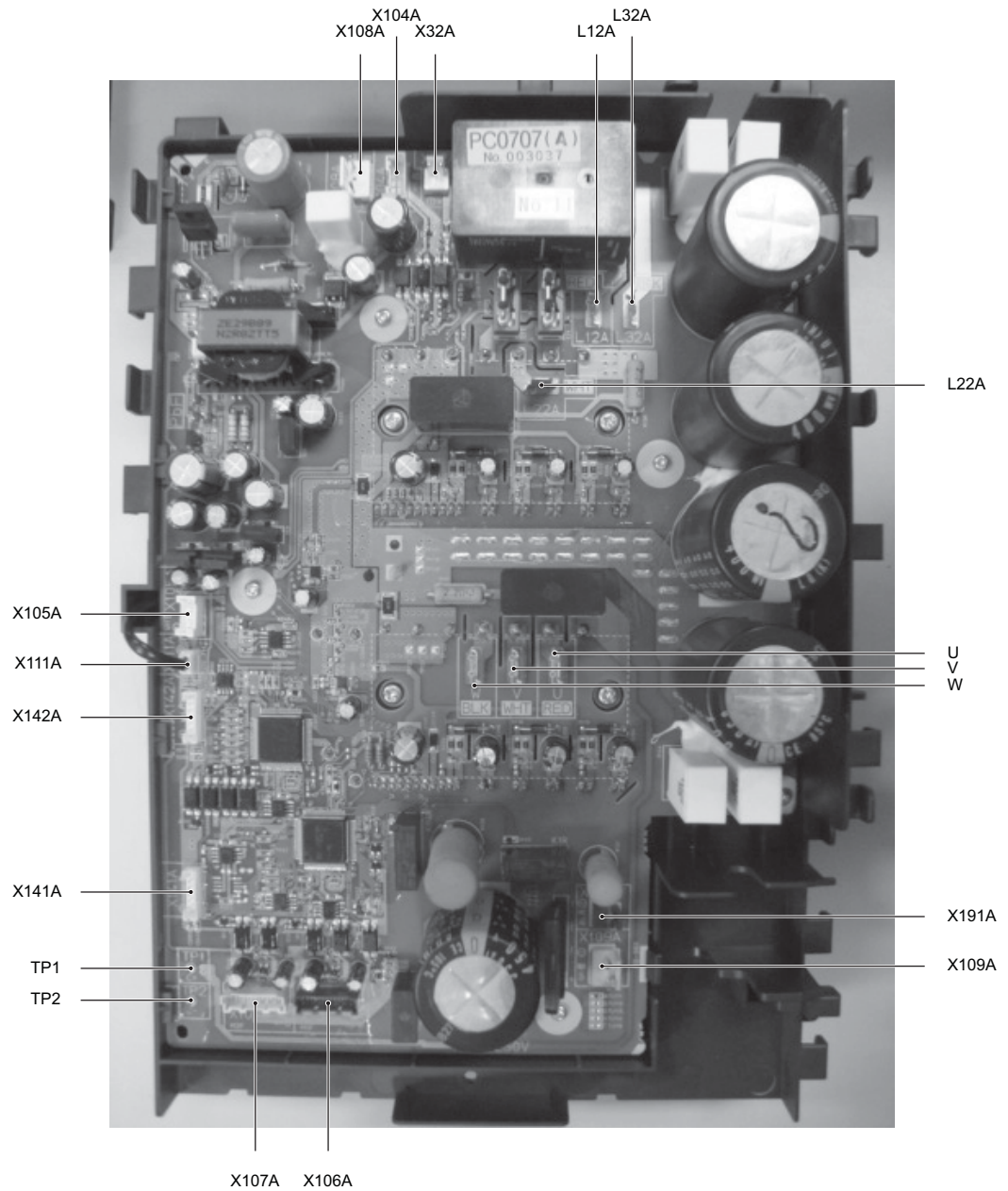


Legend

Connector	Color	Connected to - function
L1A	-	Phase L1
L2A	-	Phase L2
L3A	-	Phase L3
NA	-	Phase N
L11A	-	L11B - filter PCB
L12A	-	L21B - filter PCB
L13A	-	L31B - filter PCB
N1A	-	N1B - filter PCB
X4A	Ivory	Inverter PCB X104A
X5A	White	Inverter PCB X105A
X6A	White	-
X8A	White	Inverter PCB X108A
X9A	Orange	Inverter PCB X109A
X11A	Ivory	R1T
X12A	Blue	R2T, R3T, R4T and R5T
X13A	Ivory	R6T
X17A	Red	S1NPH
X18A	Blue	S1NPL
X21A	Ivory	EV - Y1E
X25A	Blue	Y1S
X27A	Pink	Y3S
X28A	Grey	E1HC
X41A	Blue	-
X77A	Yellow	ENE - 200V
X803A	Black	-
F1U, F2U	-	Fuse 31,5A - 250V
F3U, F4U	-	Fuse 6,3A - 250V
F5U	-	Fuse 6,3A - 250V

2.7 Inverter PCB - Three Phase - A5P

Inverter PCB - three phase

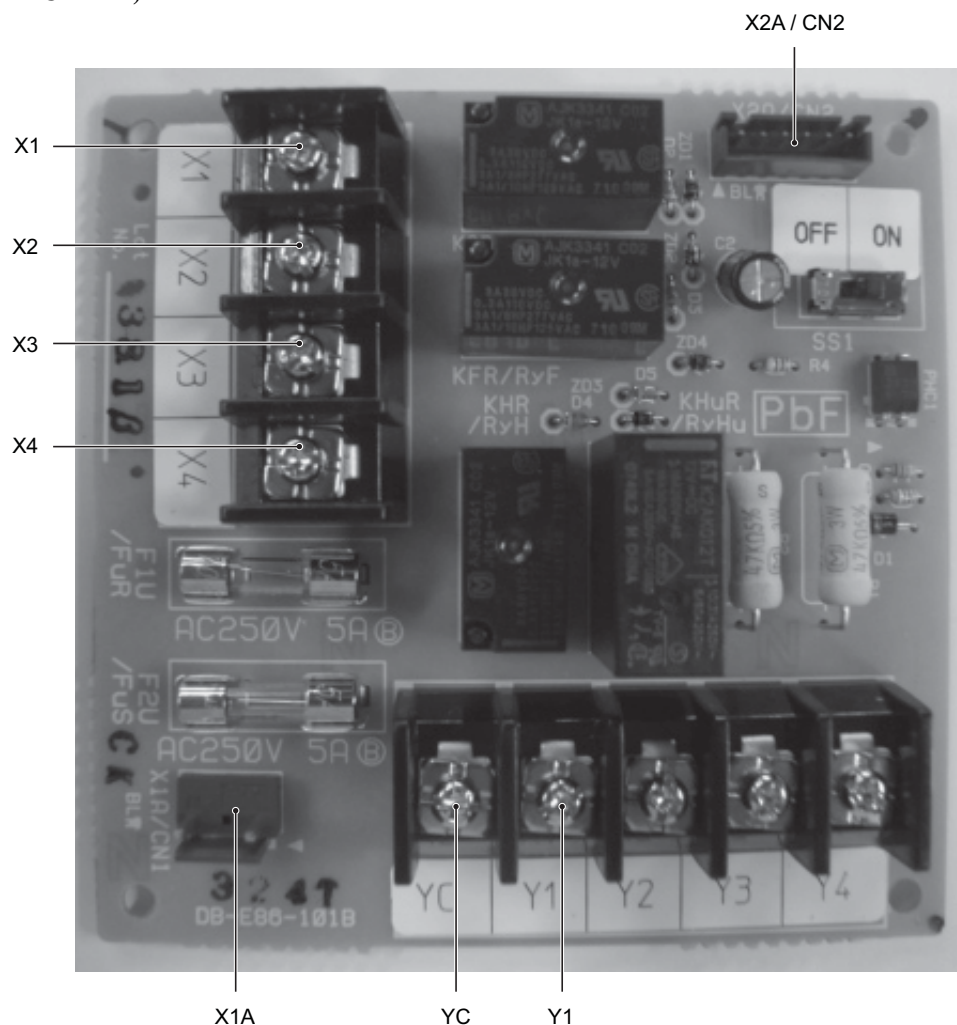


Legend

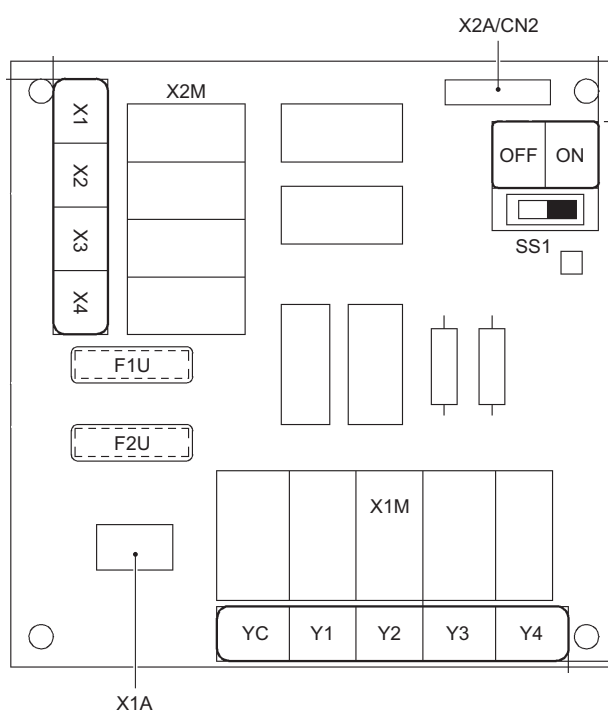
Connector	Color	Connected to - function
L12A	-	Reactor - phase 1
L22A	-	Reactor - phase 2
L32A	-	Reactor - phase 3
U	-	Compressor - phase U
V	-	Compressor - phase V
W	-	Compressor - phase W
X32A	White	HPS
X104A	Ivory	Control PCB X4A
X105A	White	Control PCB X5A
X106A	Red	Fan motor M1F
X107A	Ivory	Fan motor M2F
X108A	White	Control PCB X8A
X109A	Orange	Control PCB X9A
X111A	White	Fin thermistor
X141A	White	-
X142A	White	-
X191A	Blue	Fan reactor
T1	-	Test pin DC+
T2	-	Test pin DC-

2.8 Digital I/O PCB (Option PCB A7P)

Digital I/O PCB (option PCB A7P)



Digital I/O PCB (option PCB A7P)

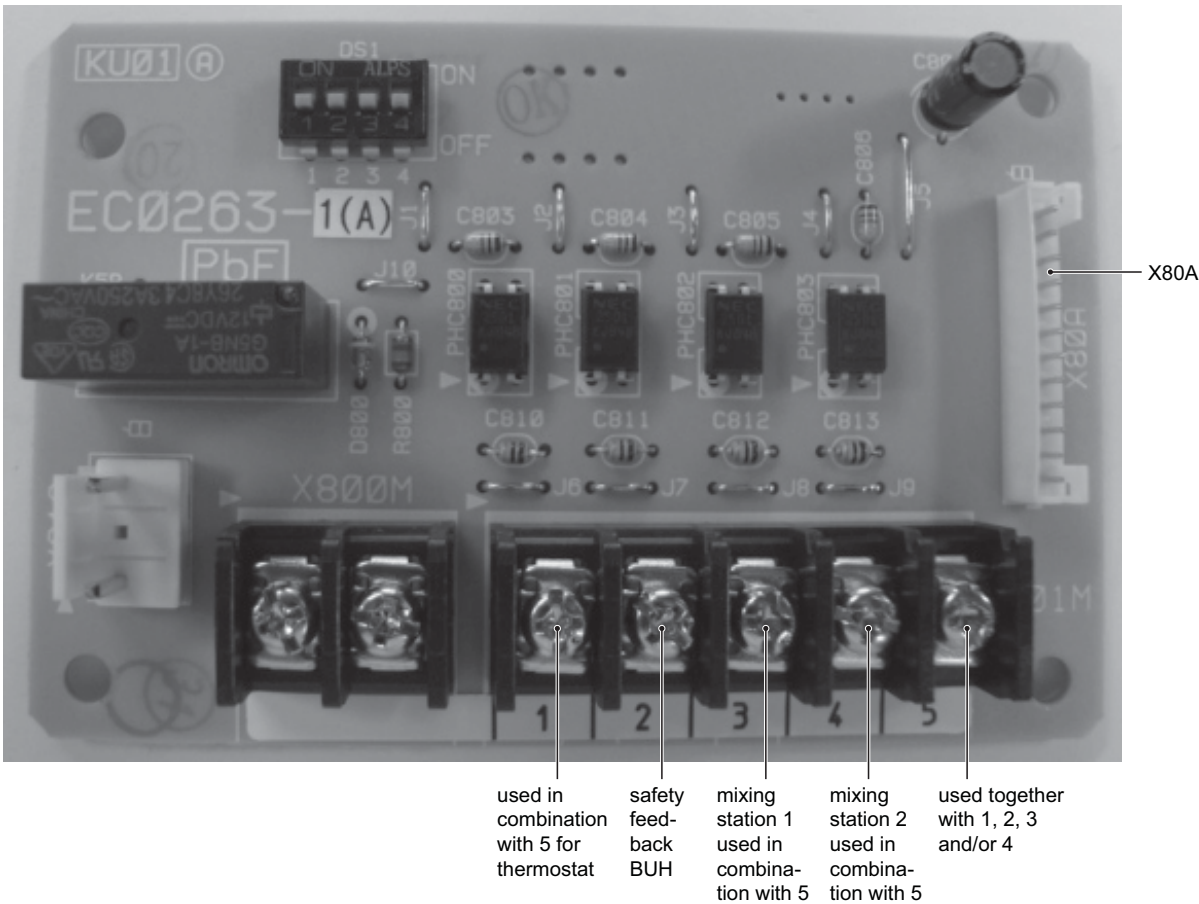


Legend

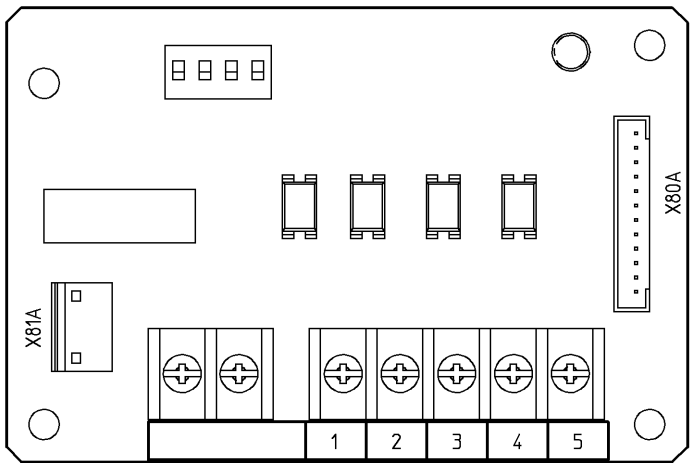
Connector	Color	Connected to - function
X1A	White	X2M [6 - 7]
X2A	White	X33A of main PCB (A1P)
X1	-	Cooling/heating ON/OFF output (optional power supply)
X2	-	
X3	-	Alarm output (optional power supply)
X4	-	
Y1 - YC	-	Domestic hot water mode ON/OFF output
Y3 - YC	-	Solar priority

2.9 Demand PCB (Option PCB A8P)

Demand PCB (option PCB A8P)



Demand PCB (option PCB A8P)



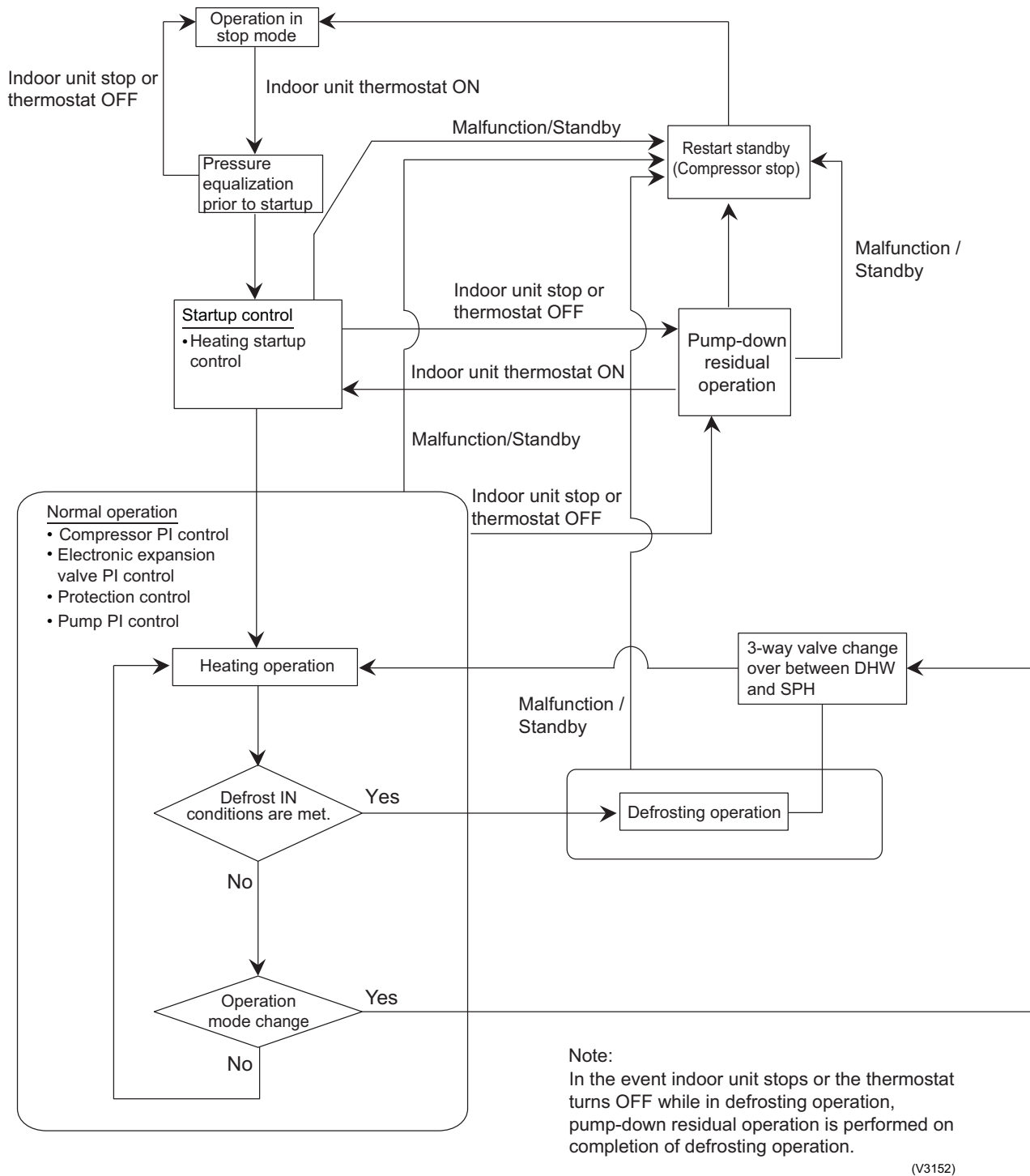
Legend

Connector	Color	Connected to - function
X80A	White	X85A of main PCB A1P
1 - 5	-	2 core cable for EKRTW on X1M [H - COM] of PCB A10P
1 - 5	-	2 core cable for EKRTR on X1M [H - COM] of PCB A11P + X2M [6 - 7] to X2M [L - N] of A11P + X1M [1 - 3] of A10P to R2T
2 - 5	-	2 core cable for BUH
3 - 5	-	2 core cable for mixing station 1
4 - 5	-	2 core cable for mixing station 2

Part 5 - Function

1. Operation Mode	54
2. Basic Control.....	55
2.1 Normal Operation	55
2.2 Compressor PI Control	56
2.3 Electronic Expansion Valve PI Control R-410A circuit.....	57
2.4 Electronic Expansion Valve PI Control R-134a circuit.....	57
3. Special Control.....	58
3.1 Startup Control.....	58
3.2 Defrosting Operation	59
3.3 Pump-down Residual Operation.....	60
3.4 Stopping Operation	61
4. Protection Control	62
4.1 High Pressure Protection Control	62
4.2 Low Pressure Protection Control.....	64
4.3 Discharge Pipe Protection Control	66
4.4 Inverter Protection Control	67
5. Other Control	69
5.1 Heating Operation Prohibition.....	69
5.2 Inverter Fan Control (Switch Box Fan)	69
5.3 Crankcase Heater	69
6. Outline of Control (Indoor Unit).....	70
6.1 Freeze Prevention	70
6.2 Simultaneous demand of space heating and domestic water heating	71

1. Operation Mode



2. Basic Control

2.1 Normal Operation

■ Heating Operation Outdoor Unit

Actuator	Operation	Remarks
Compressor	Compressor PI control	Used for high pressure protection control, low pressure protection control, discharge pipe temperature protection control, and compressor operating frequency upper limit control with inverter protection control.
Outdoor unit fan	STEP 7 or 8	All steps possible, mainly STEP 7 OR 8
Four way valve	ON	—
Main electronic expansion valve (EV1)	PI control	—
Subcooling electronic expansion valve (EV3)	PI control	—
Hot gas bypass valve (SVP)	OFF	This valve turns on with low pressure protection control.

★Heating operation is not functional at an outdoor air temperature of field setting [9-02]. Default [20°C - 24°C].

■ Heating Operation Indoor Unit

Actuator	Operation	Remarks
Compressor	Compressor PI control	Used for high pressure protection control, low pressure protection control, discharge pipe temperature protection control, and compressor operating frequency upper limit control with inverter protection control.
Four way valve (Y1R)	OFF	Only activated during defrost.
Two way valve (K2S) = solenoid valve	CLOSED	Only open during defrost.
Electronic expansion valve (K1E)	PI control	—
Electronic expansion valve (K2E)	PI control	—
DC inverter pump	PI control	—

2.2 Compressor PI Control

Compressor PI Control

Carries out the compressor capacity PI control to maintain Tc at constant during heating operation to ensure stable unit performance.

Outdoor compressor (R-410A)

STn	INV(Fullload)	INV(Unload)
1		36.0Hz
2		39.0Hz
3		43.0Hz
4		47.0Hz
5		52.0Hz
6	52.0Hz	57.0Hz
7	57.0Hz	64.0Hz
8	62.0Hz	71.0Hz
9	68.0Hz	78.0Hz
10	74.0Hz	

STn	INV(Fullload)	INV(Unload)
11	80.0Hz	
12	86.0Hz	
13	92.0Hz	
14	98.0Hz	
15	104.0Hz	
16	110.0Hz	
17	116.0Hz	
18	122.0Hz	
19	128.0Hz	
20	134.0Hz	

STn	INV(Fullload)	INV(Unload)
21	140.0Hz	
22	146.0Hz	
23	152.0Hz	
24	158.0Hz	
25	164.0Hz	
26	170.0Hz	
27	175.0Hz	
28	180.0Hz	
29	185.0Hz	
30	190.0Hz	

* Compressors may operate in a pattern other than those listed in above tables subject to the operating conditions.

Selection of full load operation to/from unload operation is made with the unload circuit solenoid valve (Y3S=SVUL). The full load operation is performed with the SVUL set to OFF, while the unload operation is performed with the SVUL set to ON.

Indoor compressor (R-134a)

STEP	INV
1	40.0Hz
2	46.0Hz
3	52.0Hz
4	57.0Hz
5	62.0Hz
6	68.0Hz
7	74.0Hz
8	80.0Hz
9	86.0Hz
10	92.0Hz

STEP	INV
11	98.0Hz
12	104.0Hz
13	110.0Hz
14	116.0Hz
15	122.0Hz
16	128.0Hz
17	134.0Hz
18	138.0Hz
19	144.0Hz
20	152.0Hz

STEP	INV
21	158.0Hz
22	164.0Hz
23	170.0Hz
24	174.0Hz
25	182.0Hz
26	188.0Hz
27	194.0Hz
28	200.0Hz
29	206.0Hz
30	210.0Hz

11kW -> max. 21 steps

14kW -> max. 26 steps

16kW -> max. 30 steps

2.3 Electronic Expansion Valve PI Control R-410A circuit

Main Electronic Expansion Valve EV1 Control - Outdoor Unit

Carries out the electronic expansion valve (Y1E) PI control to maintain the evaporator outlet superheated degree (SH) at constant during heating operation to make maximum use of the outdoor unit heat exchanger (evaporator).

$$SH = Ts1 - Te$$

SH : Evaporator outlet superheated degree (°C)

Ts1 : Suction pipe temperature detected by thermistor R3T (°C)

Te : Low pressure equivalent saturation temperature (°C)

The optimum initial value of the evaporator outlet superheated degree is 3°C, but varies depending on the discharge pipe superheated degree of inverter compressor.

Subcooling Electronic Expansion Valve EV3 Control - Outdoor Unit

Makes PI control of the electronic expansion valve (Y3E) to keep the superheated degree (SH) of the outlet gas pipe on the evaporator side for the full use of the subcooling heat exchanger.

$$SH = Tsh - Te$$

SH : Outlet superheated degree of evaporator (°C)

Tsh : Suction pipe temperature detected with the thermistor R4T (°C)

Te : Low pressure equivalent saturation temperature (°C)

Electronic Expansion Valve K1E Control - Indoor Unit

Carries out the electronic expansion valve (K1E) PI control to maintain the condensor outlet subcooled degree (SC) at constant during heating operation to make maximum use of the indoor unit heat exchanger (condensor).

$$SC = Tc - R3T$$

2.4 Electronic Expansion Valve PI Control R-134a circuit

Electronic Expansion Valve K2E Control - Indoor Unit

Carries out the electronic expansion valve (K1E) PI control to maintain the condensor outlet subcooled degree (SC) at constant during heating operation to make maximum use of the indoor unit heat exchanger (condensor).

$$SC = Tc - R7T$$

3. Special Control

3.1 Startup Control

This control is used to equalize the pressure in the front and back of the compressor prior to the startup of the compressor, thus reducing startup loads. Furthermore, the inverter is turned ON to charge the capacitor.

In addition, to avoid stresses to the compressor after the startup, the following control is made and the position of the four way valve is also determined. To position the four way valve, the master and slave units simultaneously start up.

3.1.1 Startup Control in Heating Operation

Outdoor		Thermostat ON	
	Pressure equalization control prior to startup	Startup control	
		STEP1	STEP2
Compressor	0 Hz	57 Hz Unload	57 Hz Unload +2 steps/20 sec. (until $P_c - P_e > 0.39\text{MPa}$ is achieved)
Outdoor unit fan	From starting ~ 1 min. : STEP 7 1 ~ 3 min. : STEP 3 3 ~ 5 min. : OFF	STEP8	STEP8
Four way valve	Holds	ON	ON
Main electronic expansion valve (EV1)	0 pls	0 pls	0 pls
Subcooling electronic expansion valve (EV3)	0 pls	0 pls	0 pls
Hot gas bypass valve (SVP)	OFF	OFF	OFF
Ending conditions	OR <ul style="list-style-type: none">• $P_c - P_e < 0.3\text{MPa}$• A lapse of 1 to 5 min.	A lapse of 10 sec.	OR <ul style="list-style-type: none">• A lapse of 130 sec.• $P_c > 2.70\text{MPa}$• $P_c - P_e > 0.39\text{MPa}$

Indoor		
	STEP1	STEP2
Indoor compressor	First 10 minutes -> maximum 128 Hz*	To maximum frequency
4-way valve	OFF	OFF
Pump	HOT START OR <ul style="list-style-type: none">• High pressure side > 14 bar• Maximum 5 minutes	Gradual to PI control

* Always after POWER ON/OFF, compressor frequency is limited. This is not the case after thermo ON/OFF/ON.

Remark: A thermostat ON demand will activate the outdoor fan, followed by the outdoor compressor and finally indoor compressor.

3.2 Defrosting Operation

The defrost operation is performed to solve frost on the outdoor unit heat exchanger when heating mode is active to recover the heating capacity.

[Conditions to start]

The defrost operation is started referring following conditions.

- Outdoor heat exchanger heat transfer co-efficient
- Temperature of heat-exchange (T_b) < T_{def}^*
- Timer (25 min. the minimum)

In addition, outdoor heat-exchanger co-efficient is derived from T_c , T_e , and the compressor load.

* T_{def} can vary but is at least -10°C

[Fan defrosting]

- When compressor stops, 80 sec. at low RPM
- At start up compressor, 30 sec. at 950 RPM (step 9)
- Then goes back to normal RPM

3.3 Pump-down Residual Operation

When activating compressor, if the liquid refrigerant remains in the heat-exchanger, the liquid enters into the compressor and dilutes oil therein resulting in decrease of lubricity.

Therefore, the pump-down residual operation is performed to collect the refrigerant in the heat-exchanger when the compressor is down.

3.3.1 Pump-down Residual Operation in Heating Operation [R-410A]

Actuator	Pump-down residual operation
Compressor	124 Hz Full load
Outdoor unit fan	STEP7
Four way valve	ON
Main electronic expansion valve (EV1)	0 pls
Subcooling electronic expansion valve (EV3)	0 pls
Hot gas bypass valve (SVP)	OFF
Ending conditions	4 sec.

3.4 Stopping Operation

Operation of the actuator when the system is down, is cleared up.

3.4.1 When System is in Stop Mode

OUTDOOR

Actuator	Operation
Compressor	OFF
Outdoor unit fan	OFF
Four way valve	Keep former condition.
Main electronic expansion valve (EV1)	0 pls
Subcooling electronic expansion valve (EV3)	0 pls
Hot gas bypass valve (SVP)	OFF
Ending conditions	Request for space heating OR hot water production

INDOOR

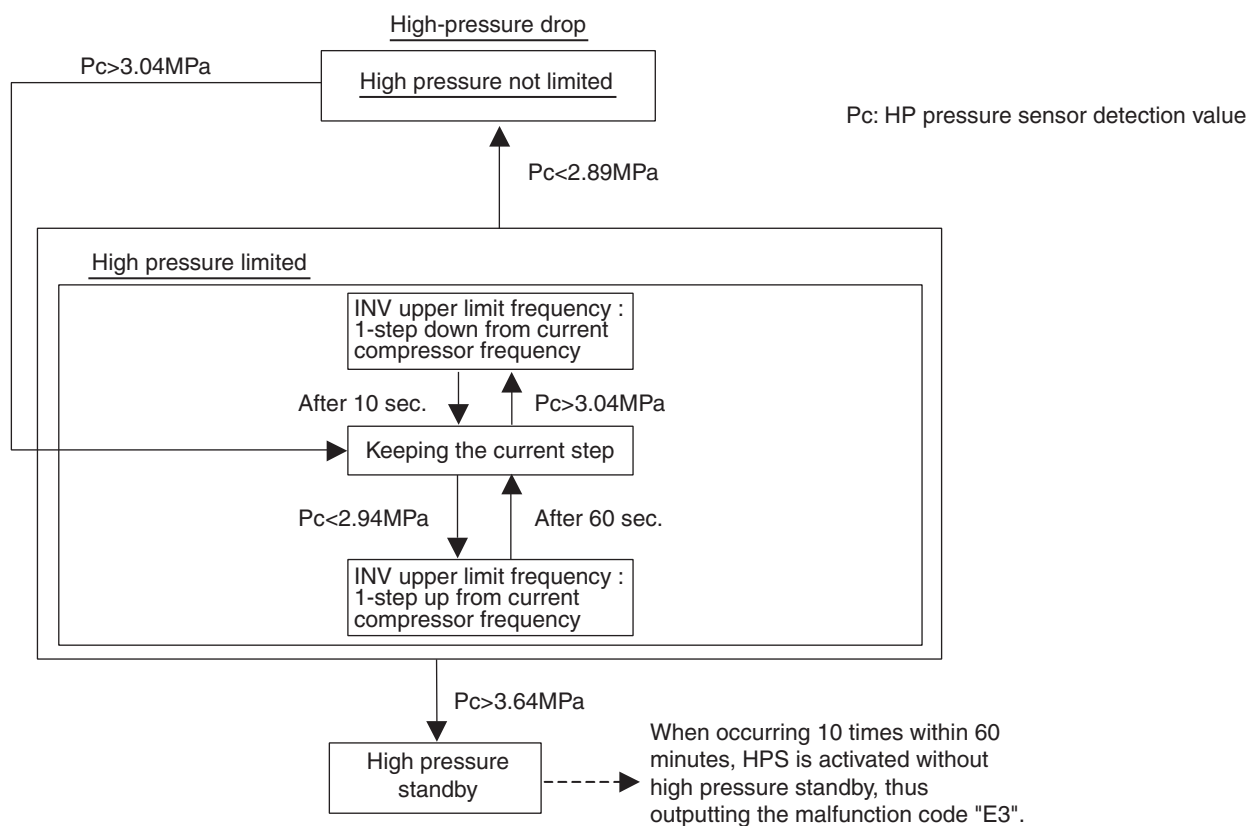
Actuator	Operation
Compressor	OFF
4-way valve	Keep former condition.
Pump	OFF
Electronic expansion valve K1E - R-410A	0 pls
Electronic expansion valve K2E - R-134a	0 pls
Ending conditions	Request for space heating OR hot water production

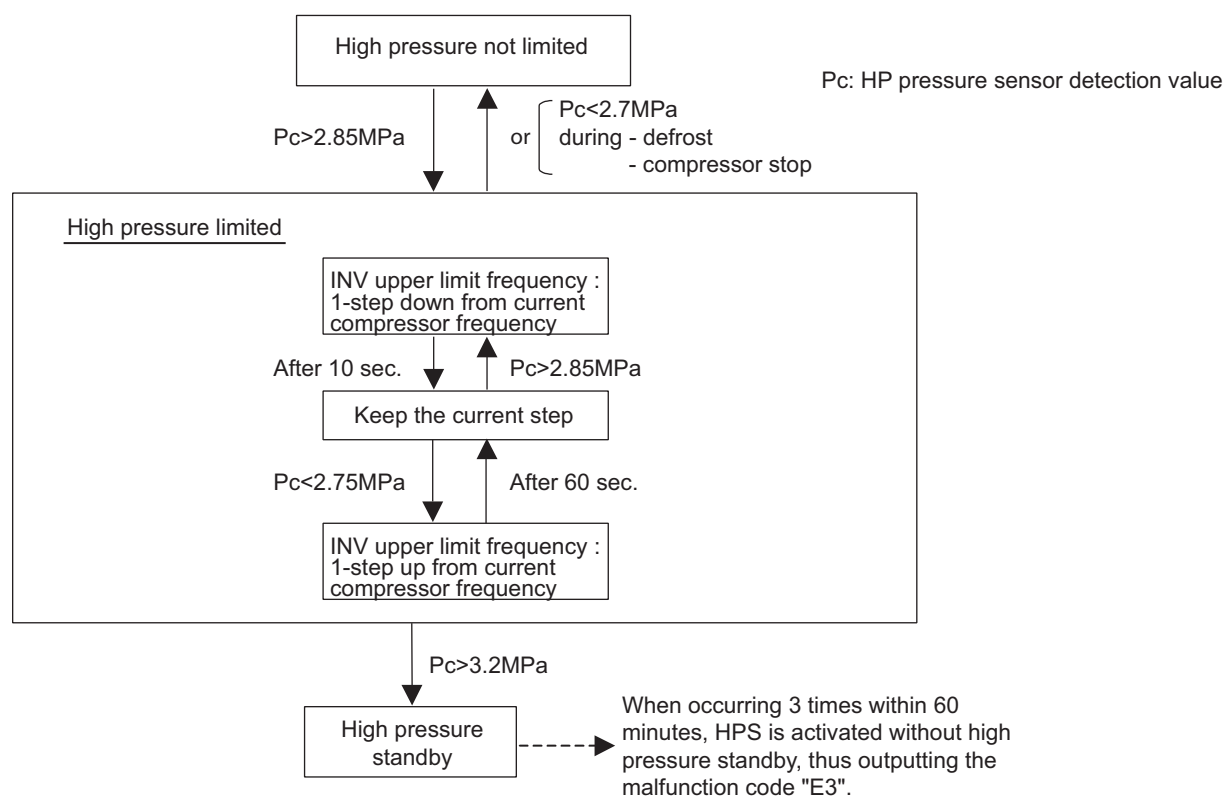
4. Protection Control

4.1 High Pressure Protection Control

This high pressure protection control is used to prevent the activation of protection devices due to abnormal increase of high pressure and to protect compressors against the transient increase of high pressure.

In heating operation [R-410A]



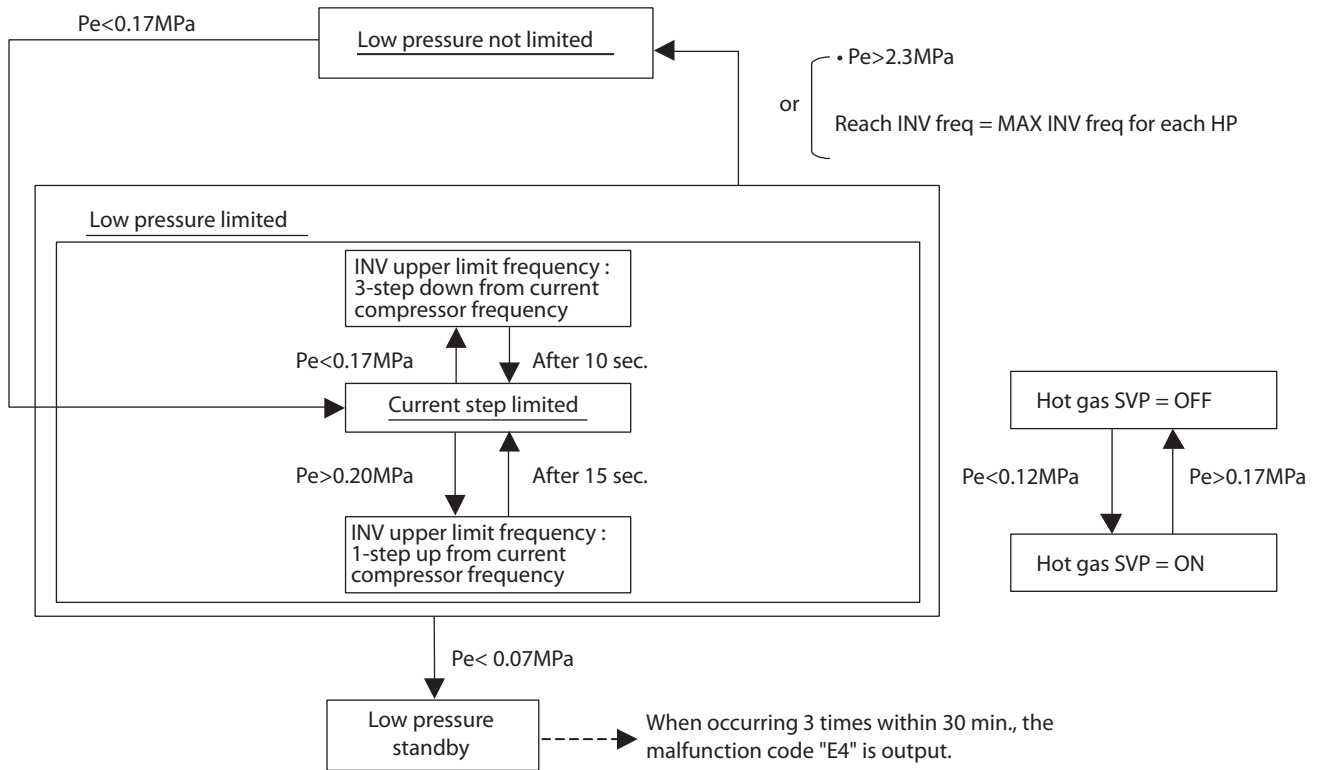
In heating operation [R-134a]High pressure drop

4.2 Low Pressure Protection Control

This low pressure protection control is used to protect compressors against the transient decrease of low pressure.

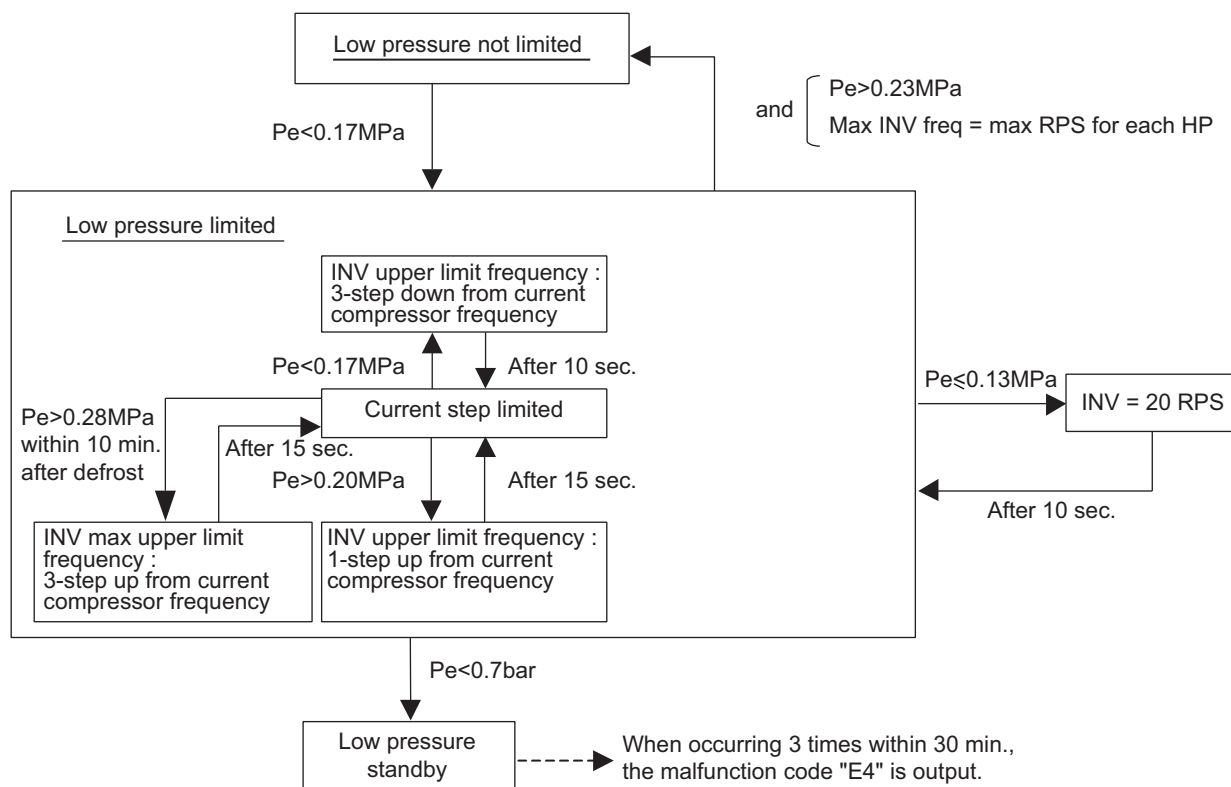
In heating operation [R-410A]

Pe: LP pressure sensor detection value



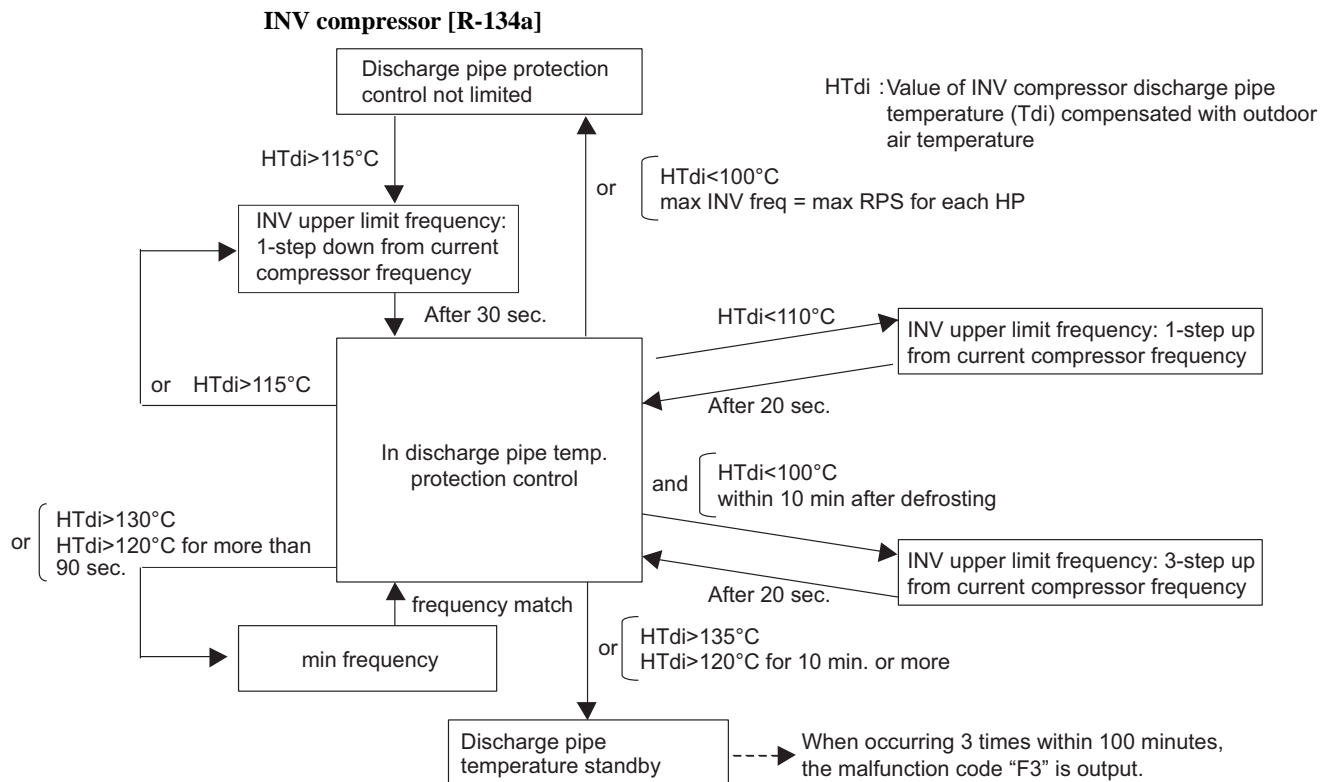
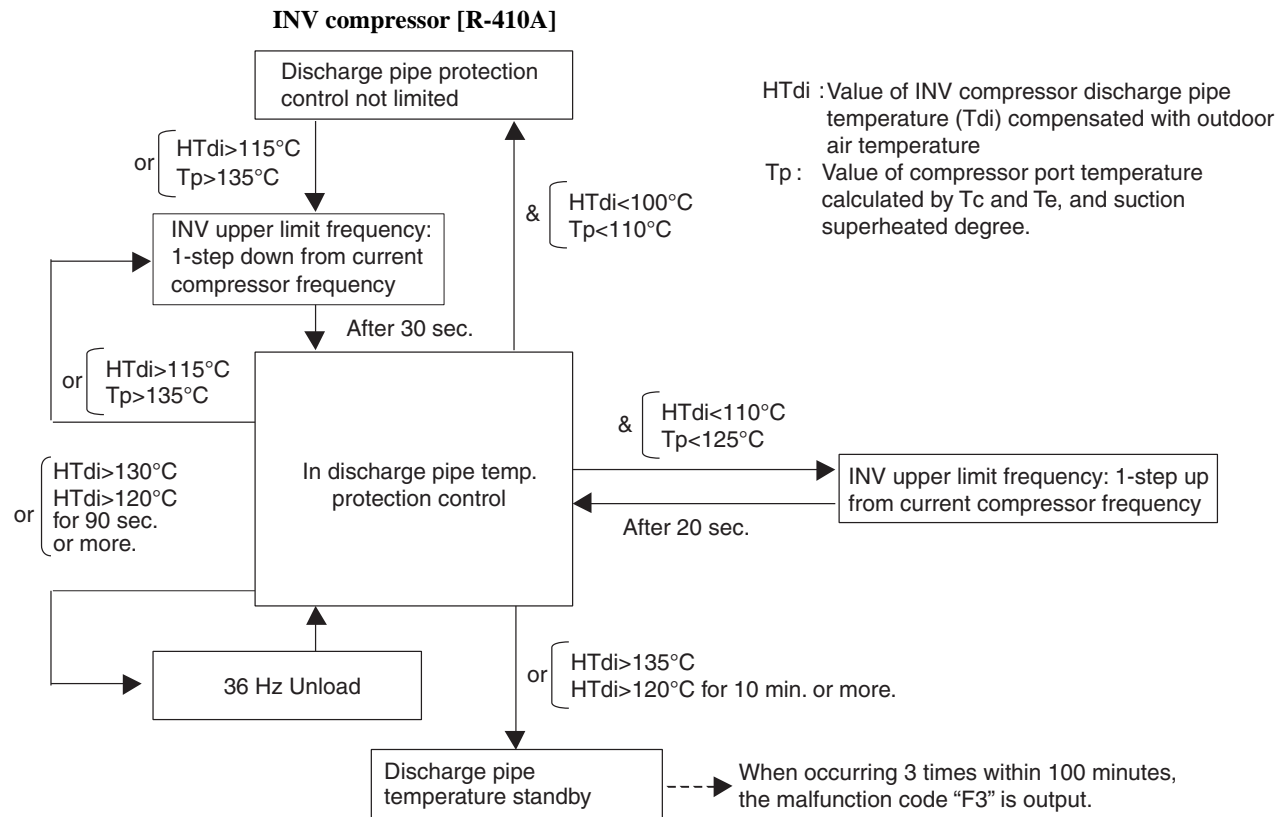
In heating operation [R-134a]

Pe: LP pressure sensor detection value



4.3 Discharge Pipe Protection Control

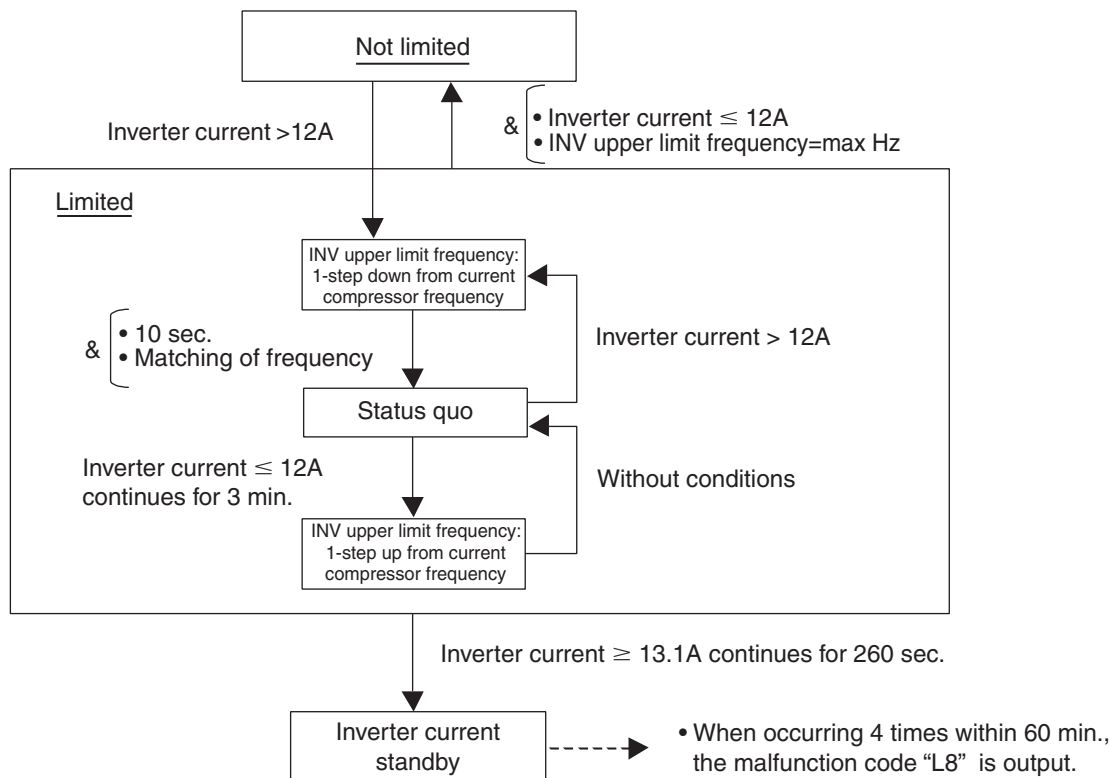
This discharge pipe protection control is used to protect the compressor internal temperature against a malfunction or transient increase of discharge pipe temperature.



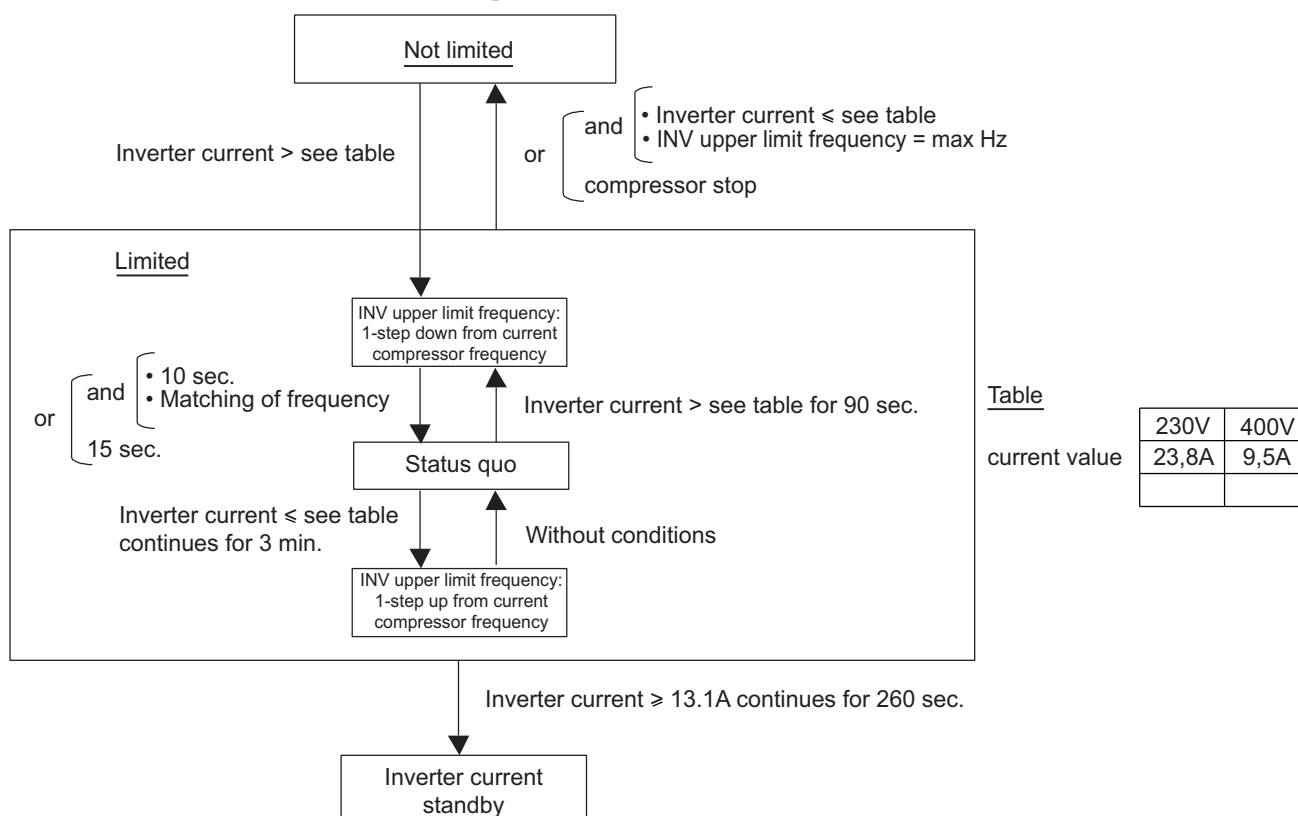
4.4 Inverter Protection Control

Inverter current protection control and inverter fin temperature control are performed to prevent tripping due to a malfunction, or transient inverter overcurrent, and fin temperature increase.

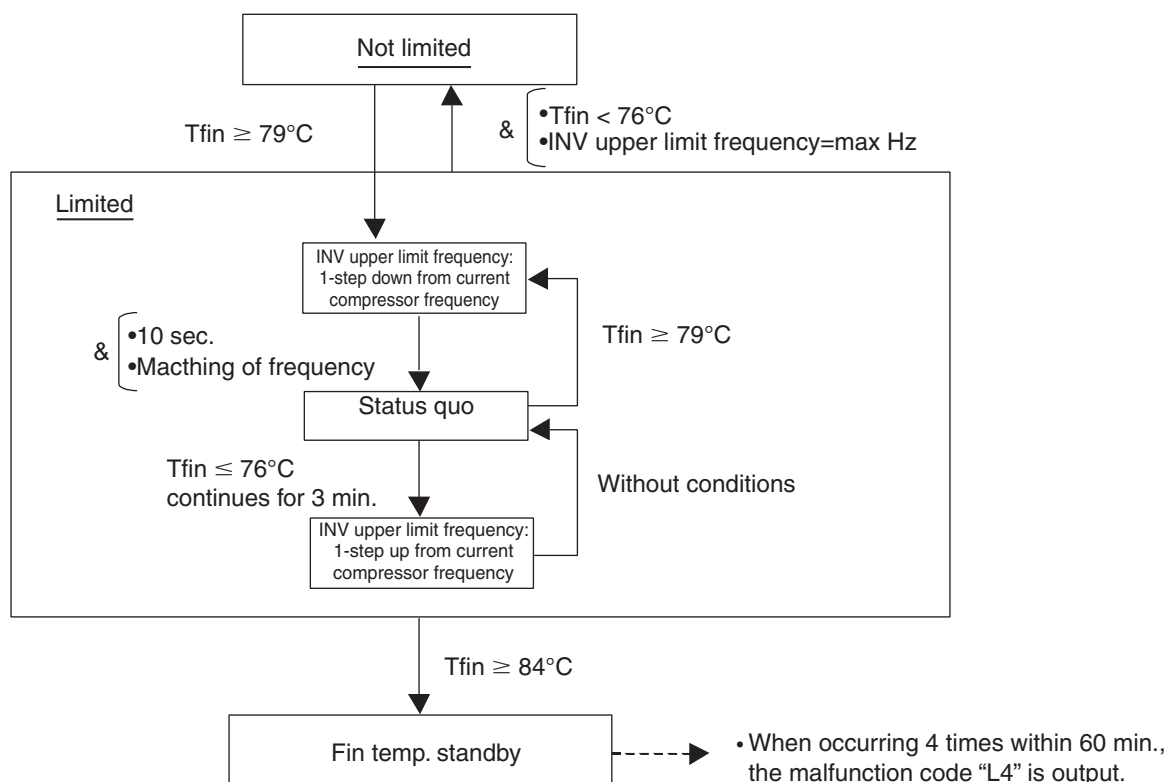
Inverter overcurrent protection control [R-410A]



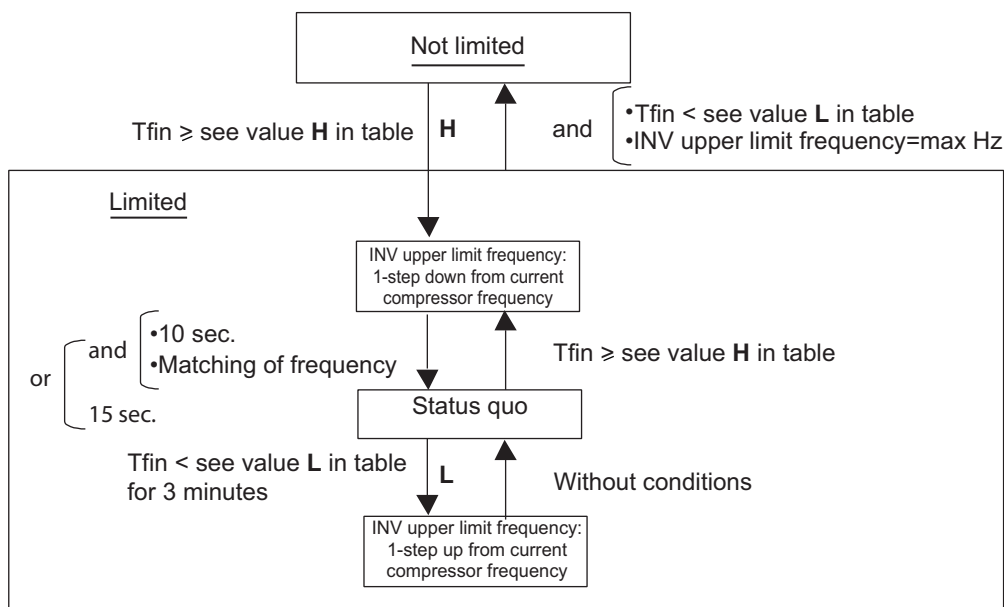
Inverter overcurrent protection control [R-134a]



Inverter fin temperature control [R-410A]



Inverter fin temperature control [R-134a]



Table

	230V	400V
H	78°	79°
L	75°	76°

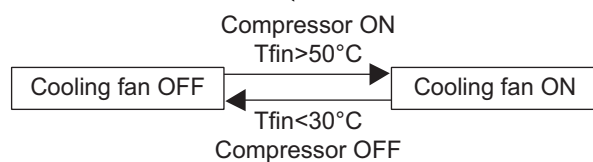
5. Other Control

5.1 Heating Operation Prohibition

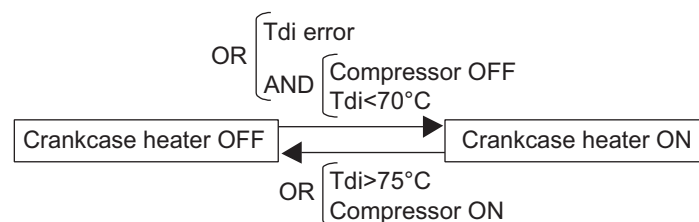
- If the ambient temperature becomes higher than ($24^{\circ}\text{C} + \text{value of setting [9-02]}$) no space heating is possible
- Heating for domestic hot water is possible till 35°C ambient temperature.

For more details see chapter of settings.

5.2 Inverter Fan Control (Switch Box Fan)



5.3 Crankcase Heater



6. Outline of Control (Indoor Unit)

6.1 Freeze Prevention

Freeze-up Prevention by Thermo Off Condition

The freeze-up prevention is only active when the unit is in thermo OFF condition.

[Start condition]

AND/OR*:

- Outdoor ambient temperature < 4°C
- Leaving or return water temperature < 7°C

* AND/OR depending of setting [8 - 04] for further details see chapter of setting.

[Operation]

Pump will operate and if leaving OR return water < 5°C for 5 minutes, the unit will start up the freeze-up prevention function to prevent too low temperatures.

6.2 Simultaneous demand of space heating and domestic water heating

Space heating operation can be executed in 3 different ways:

- Remote controller leaving water temperature control
- External room thermostat
- Remote controller room temperature control

The domestic water heating operation can be controlled in 2 different ways:

- Reheat operation:
The reheat mode will prevent the domestic hot water from cooling down lower than a certain temperature. When enabled the indoor unit will deliver hot water to the domestic hot water tank if the minimum value is reached and this according below described settings. *1
- Storage operation:
In this mode, the indoor unit will deliver hot water to the domestic hot water tank based on a daily pattern (day and/or night). The heated water is stored at a higher temperature so it can fulfill the domestic hot water requirements throughout the day. *2

***1 Remark:** This function can only be activated by the shower button. Shower icon should be led.

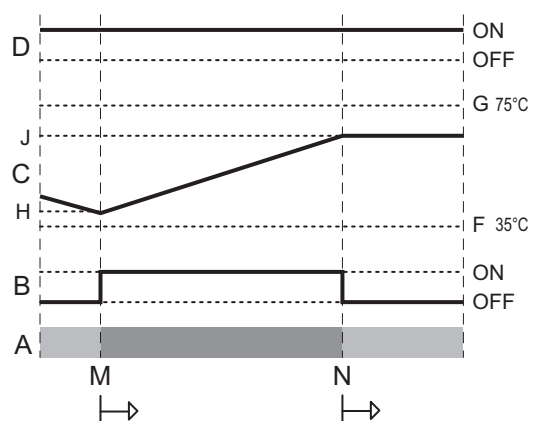
***2 Remark:** This function can only be set by field settings. This function can only be activated by the schedule timer button and this icon should be led.

Remote controller leaving water temperature control

When the reheat temperature is reached, the further heat up till storage temperature of the domestic hot water tank will be decided by the running timers which are programmed by the installer.

1. Reheat operation

When requesting space heating and domestic water heating (reheat) at the same time, this involves that the minimum reheat temperature is reached (setting [b-00]) during space heating operation. The 3-way valve will switch over to the domestic hot water side. Now, the domestic water will be heated till maximum reheat temperature (setting [b-01]). The 3-way valve will switch back to original position, then space heating will start again. When a domestic hot water tank is installed, the reheat function is always available. The minimum domestic hot water reheat temperature is 35°C and the maximum value is 75°C.



A Operation

Space heating

Domestic water heating

B Domestic hot water reheat thermo-on request

C Domestic hot water tank temperature

D Leaving water thermo-on request

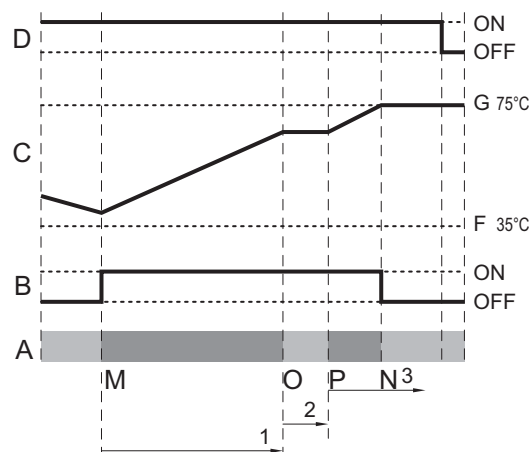
F Domestic hot water lower limit temperature

G Domestic hot water upper limit temperature (maximum possible storage temperature) [b-03]

H	Domestic hot water reheat minimum temperature [b-00]
J	Domestic hot water reheat maximum temperature [b-01]
M	Simultaneous demand
N	ONLY space heating request
ON	ON
OFF	OFF

2. Storage operation

When requesting space heating and domestic water heating (storage) at the same time, this involves that the storage function is active and the start timer is reached (setting 1) during space heating operation. The 3-way valve will switch over to domestic water heating operation. Now domestic water will be produced till set point is reached or according to the running timer (setting [d-01]). The 3-way valve will switch back to space heating mode for the interval period (setting [d-02]). After this interval the 3-way valve will go back to domestic water mode. This will continue till set point is reached. At that moment, simultaneous request is finished and the system goes back to space heating mode.



A	Operation
	Space heating
	Domestic water heating
B	Domestic hot water storage thermo-on request
C	Domestic hot water tank temperature
D	Leaving water thermo-on request
F	Domestic hot water lower limit temperature
G	Domestic hot water upper limit temperature (maximum possible storage temperature) [b-03]
M	Simultaneous demand
N	ONLY space heating request
O	Start of interval period
P	Stop of interval period
ON	ON
OFF	OFF
1	Maximum operation time for 1 cycle of domestic water heating (initial 30 minutes [d-01])
2	Interval minimum stop time for domestic water heating (initial 15 minutes [d-02])
3	Maximum operation time for domestic water heating (initial 30 minutes [d-01])

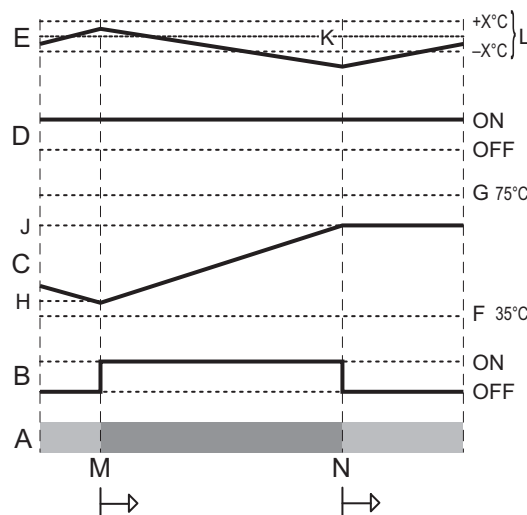
External room thermostat

When the reheat temperature is reached, the further heat up of the domestic hot water tank will be decided by the external room thermostat thermo conditions and running timers which are programmed by the installer.

1. Reheat operation

When requesting space heating and domestic water heating (reheat) at the same time. This involves that the minimum reheat temperature is reached (setting [b-00]) during space heating operation. The 3-way valve will switch over to the domestic hot water side. The domestic water will be heated till maximum reheat temperature (setting [b-01]). The 3-way valve will switch back to original position, then space heating will start again.

During the reheat operation, the system does not take care about the room temperature. This means that during simultaneous demand, the reheat operation has priority over the room temperature.

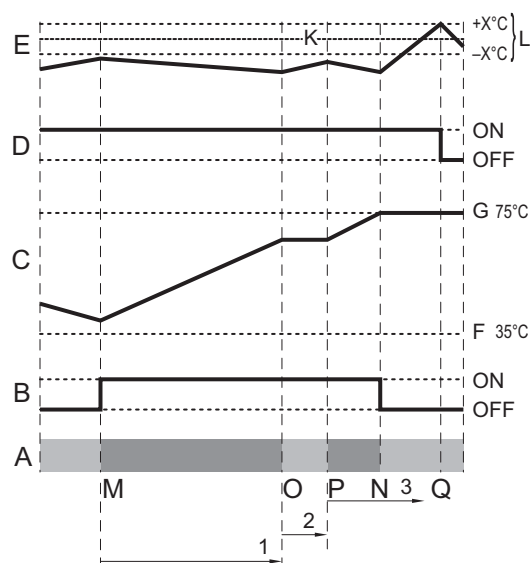


- A** Operation
- Space heating
- Domestic water heating
- B** Domestic hot water reheat thermo-on request
- C** Domestic hot water tank temperature
- D** Room temperature thermo-on request
- E** Remote controller room temperature
- F** Domestic hot water lower limit temperature
- G** Domestic hot water upper limit temperature (maximum possible storage temperature) [b-03]
- H** Domestic hot water reheat minimum temperature [b-00]
- J** Domestic hot water reheat maximum temperature [b-01]
- K** External room thermostat set point
- L** External room thermostat ON/OFF hysteresis
- M** Simultaneous demand
- N** ONLY space heating request
- ON** ON
- OFF** OFF

2. Storage operation

When requesting space heating and domestic water heating (storage) at the same time, this involves that the storage function is active and the start timer is reached (setting 1) during space heating operation. The 3-way valve will switch over to domestic water heating operation. Now domestic water will be produced till set point is reached or according to the running timer (setting [d-01]). The 3-way valve will switch back to space heating mode for the interval period (setting [d-02]). After this interval the 3-way valve will go back to domestic water mode. This will continue till set point is reached. At that moment, simultaneous request is finished and the system goes back to space heating mode.

During the storage operation, the system does not take care off the room temperature. This means that during simultaneous demand, the space only will be heated during the intervals of domestic water production.



- A** Operation
- Space heating
- Domestic water heating
- B** Domestic hot water storage thermo-on request
- C** Domestic hot water tank temperature
- D** Room temperature thermo-on request
- E** Remote controller room temperature
- F** Domestic hot water lower limit temperature
- G** Domestic hot water upper limit temperature (maximum possible storage temperature) [b-03]
- K** External room thermostat set point
- L** External room thermostat ON/OFF hysteresis
- M** Simultaneous demand
- N** ONLY space heating request
- O** Start off interval period
- P** Stop off interval period
- Q** Space heating OFF
- ON** ON
- OFF** OFF
- 1** Maximum operation time for 1 cycle of domestic water heating (initial 30 minutes [d-01])
- 2** Interval minimum stop time for domestic water heating (initial 15 minutes [d-02])
- 3** Maximum operation time for domestic water heating (initial 30 minutes [d-01])

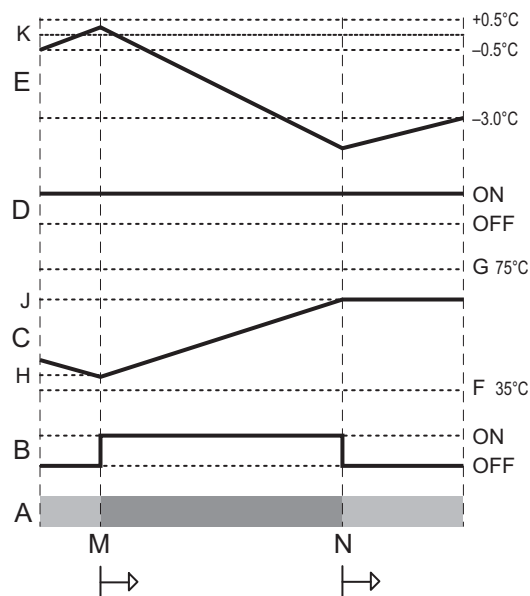
Remote controller room temperature control



When the reheat temperature is reached, the further heat up till storage temperature of the domestic hot water tank will be decided by the remote controller room thermostat in order to prevent that the room temperature drops too much.

1. Reheat operation

When requesting space heating and domestic water heating (reheat) at the same time. This involves that the minimum reheat temperature is reached (setting [b-00]) during space heating operation. The 3-way valve will switch over to the domestic hot water side. The domestic water will be heated till maximum reheat temperature (setting [b-01]). The 3-way valve will switch back to original position, then space heating will start again.

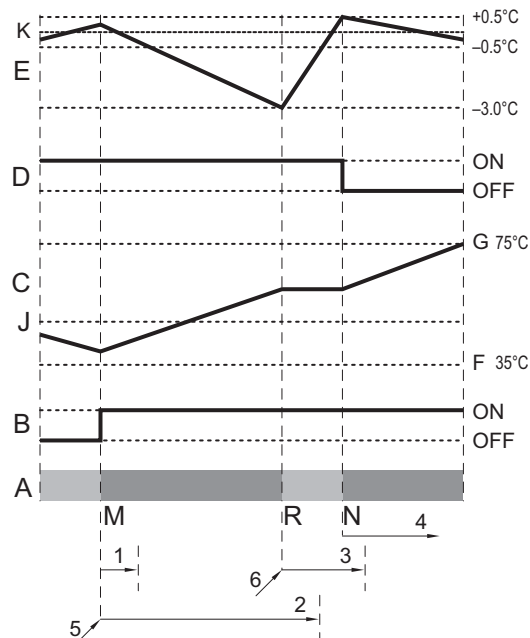
During the reheat operation, the system does not take care about the room temperature. This means that during simultaneous demand, the reheat operation has priority over the room temperature.



- A** Operation
-  Space heating
-  Domestic water heating
- B** Domestic hot water reheat thermo-on request
- C** Domestic hot water tank temperature
- D** Room temperature thermo-on request
- E** Remote controller room temperature
- F** Domestic hot water lower limit temperature
- G** Domestic hot water upper limit temperature (maximum possible storage temperature) [b-03]
- H** Domestic hot water reheat minimum temperature [b-00]
- J** Domestic hot water reheat maximum temperature [b-01]
- K** Remote controller thermostat set point
- M** Simultaneous demand
- N** ONLY space heating request
- ON** ON
- OFF** OFF

2. Storage operation

When requesting space heating and domestic water heating (storage) at the same time, this involves that the minimum reheat temperature is reached (setting [b-00]) during space heating operation. The 3-way valve will switch over to the domestic hot water side, then the domestic water will be heated, but as soon as the room temperature drops 3°C from set point (smart logic), the 3-way valve will go to original position and start space heating till 0.5°C above set point, then the 3-way valve will switch over to the domestic hot water side and then the domestic water will be heated again till storage set point.



A Operation

Space heating

Domestic water heating

B Domestic hot water storage thermo-on request

C Domestic hot water tank temperature

D Room temperature thermo-on request

E Remote controller room temperature

F Domestic hot water lower limit temperature

G Domestic hot water upper limit temperature (maximum possible storage temperature) [b-03]

J Domestic hot water reheat maximum temperature [b-01]

K Remote controller thermostat set point

M Simultaneous demand

N ONLY domestic hot water request

R Point where space heating gets priority

ON ON

OFF OFF

1 Minimum operation time for domestic water heating (initial 10 minutes [d-00]) ^(a)

2 Maximum operation time for domestic water heating (initial 30 minutes [d-01]) ^(b)

3 Interval minimum stop time for domestic water heating (initial 15 minutes [d-02])

N=4 No simultaneous operation

5 Timers for domestic water heating start

6 Timer for space heating start

Remark:

a. The minimum operation time is only valid when room temperature is more than 3°C lower as set point and set point J is reached.

b. The maximum operation time is only valid when room temperature is more than 0.5°C lower as set point and set point J is reached.

Part 6 - Test Operation

1. Test Operation.....	78
1.1 Procedure and Outline	78
1.2 Air Tight Test and Vacuum Drying.....	80
1.3 Additional Refrigerant Charge	81
1.4 Operation when Power is Turned On	85
2. Outdoor Unit PC Board Layout	86
3. Field Setting	87
3.1 Field Setting from remote control.....	87
3.2 Field Setting from Outdoor Unit.....	115

1. Test Operation

1.1 Procedure and Outline

Follow the following procedure to conduct the initial test operation after installation.

1.1.1 Check Work Prior to Turn Power Supply On

Check the below items.

- Power wiring
- Control transmission wiring between units
- Earth wire



Check on refrigerant piping



Check air tight test and vacuum drying



Check on amount of refrigerant charge



Check on water piping

- Is the power supply according unit specifications?
- Have you finished a ductwork to drain?
- Have you detach transport fitting?
- Is the wiring performed as specified? Is the unit properly earthed?
- Are the designated wires used?
- Is the grounding work completed? Is the insulation resistance at least 1MΩ?
 - Use a 500V megger tester to measure the insulation.
 - Do not use a megger tester for low voltage circuits.
- Are the setscrews of wiring not loose?
- Is the electrical component box covered with an insulation cover completely?
- Is pipe size proper? (The design pressure of this product is 4.0MPa.)
- Are pipe insulation materials installed securely?
 - Liquid and gas pipes need to be insulated. (Otherwise causes water condensation.)
- Are respective stop valves on liquid and gas line securely open?
- Have the air tight test and the vacuum drying been conducted according to the procedure in the installation manual?
 - If the power has turned on before the vacuuming has been done, you must use the outdoor setting 2-21 to open all necessary valves of indoor and outdoor unit. Only then complete vacuuming is possible.
 - See "Settings of vacuuming mode" for more details.
- Is refrigerant charged up to the specified amount?
 - If insufficient, charge the refrigerant from the service port of stop valve on the liquid side with outdoor unit in stop mode after turning power on.
- Has the amount of refrigerant + extra refrigerant piping length charge been recorded on "Record Chart of Additional Refrigerant Charge Amount"?
- Is the water pressure OK?
- Is all the water removed?
- Is there minimum 20 liters water in the system at all times?
- Is there a bypass installed?
- Are all the valves open, so water flow is guaranteed?
- Is the pre-pressure of the expansion vessel set correctly?

(V3180)

1.1.2 Turn Power On

Turn outdoor unit power on .



Turn indoor unit power on .



Carry out field setting, if
necessary



Car ry out the test run as
desc ribed in the installation
manual of the indoor unit

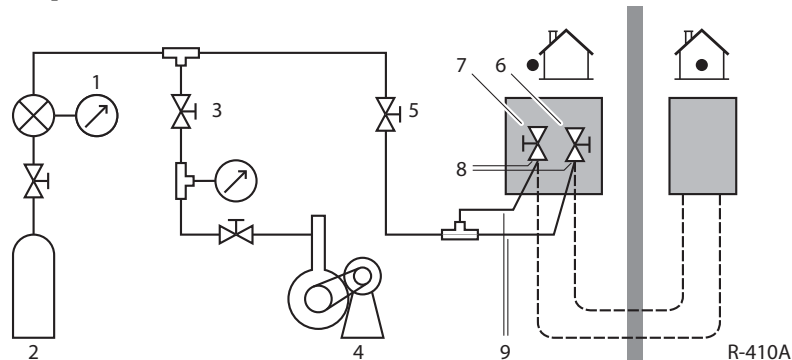
- Be sure to turn the power on 6 hours before starting operation to protect compressors.
- Close outside panels of the outdoor unit.

- Wait until initialization period is over (up to 12 min).
(Can be known by checking leds on outdoor PCB - see "Field Settings from Outdoor unit" for details.

(V3056)

1.2 Air Tight Test and Vacuum Drying

- Air tight test: Make sure to use nitrogen gas.
- **Do this before powering the unit. (If the power has been turned on before the vacuuming has been done, first setting 2-21 must be used. See “Setting of Vacuuming Mode” on page 124.)**
- Setup:



- 1 Pressure reducing valve
- 2 Nitrogen
- 3 Siphon system
- 4 Vacuum pump
- 5 Valve A
- 6 Gas line stop valve
- 7 Liquid line stop valve
- 8 Stop valve service port
- 9 Charge hose

The leak test must satisfy specification EN 378-2.

1. Vacuum leak test

- Evacuate the system from the liquid and gas piping to -100.7 kPa (5 Torr).
- Once reached, turn off the vacuum pump and check that the pressure does not rise for at least 1 minute.
- Should the pressure rise, the system may either contain moisture (see vacuum drying below) or have leaks.

2. Pressure leak test

- Break the vacuum by pressurizing with nitrogen gas to a minimum gauge pressure of 0.2 MPa (2 bar).
Never set the gauge pressure higher than the maximum operation pressure of the unit, i.e. 4.0 MPa (40 bar).
- Test for leaks by applying a bubble test solution to all piping connections.
Make sure to use a recommended bubble test solution from your wholesaler.
Do not use soap water, which may cause cracking of flare nuts (soap water may contain salt, which absorbs moisture that will freeze when the piping gets cold), and/or lead to corrosion of flared joints (soap water may contain ammonia which causes a corrosive effect between the brass flare nut and the copper flare).

3. Discharge all nitrogen gas.

- Pressurize the liquid and gas pipes to 4.0 MPa (40 bar) (do not pressurize more than 4.0 MPa (40 bar)). If the pressure does not drop within 24 hours, the system passes the test. If the pressure drops, check where the nitrogen leaks from.
- Vacuum drying: Use a vacuum pump which can evacuate to -100.7 kPa (5 Torr, -755 mm Hg). Connect the vacuum pump to both service port of the gas stop valve and the liquid stop valve to increase efficiency.
 1. Evacuate the system from the liquid and gas pipes by using a vacuum pump for more than 2 hours and bring the system to -100.7 kPa. After keeping the system under that condition for more than 1 hour, check if the vacuum gauge rises or not. If it rises, the system may either contain moisture inside or have leaks.
 2. Following should be executed if there is a possibility of moisture remaining inside the pipe (if piping work is carried out during the raining season or over a long period of time, rainwater may

enter the pipe during work).

After evacuating the system for 2 hours, pressurize the system to 0.05 MPa (vacuum break) with nitrogen gas and evacuate the system again using the vacuum pump for 1 hour to -100.7 kPa (vacuum drying). If the system cannot be evacuated to -100.7 kPa within 2 hours, repeat the operation of vacuum break and vacuum drying.

Then, after leaving the system in vacuum for 1 hour, confirm that the vacuum gauge does not rise.

If the indoor unit is changed by another indoor unit, do the above described leaktest again.

1.3 Additional Refrigerant Charge



- Refrigerant cannot be charged until field wiring has been completed.
- Refrigerant may only be charged after performing the leak test and the vacuum drying (see above).
- When charging a system, care shall be taken that its maximum permissible charge is never exceeded, in view of the danger of liquid hammer.
- Charging with an unsuitable substance may cause explosions and accidents, so always ensure that the appropriate refrigerant (R-410A) is charged for outdoor unit, use (R-134a) for indoor unit.
- Refrigerant containers shall be opened slowly.
- Always use protective gloves and protect your eyes when charging refrigerant.
- When performing service on the unit requiring the refrigerant system to be opened, refrigerant must be evacuated according to local regulations.
- When the power is on, please close the front panel when leaving the unit.

To avoid compressor breakdown. Do not charge the refrigerant more than the specified amount.

- This outdoor unit is factory charged with refrigerant and depending on pipe sizes and pipe lengths some systems require additional charging of refrigerant.
- In case re-charge is required, refer to the nameplate of the unit. The nameplate states the type of refrigerant and necessary amount.

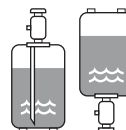
Precautions when recharging/adding R-410A & recharging R-134a

Be sure to charge the specified amount of refrigerant in liquid state to the liquid pipe.

Since this refrigerant is a mixed refrigerant, adding it in gas form may cause the refrigerant composition to change, preventing normal operation.

- Before charging, check whether the refrigerant cylinder is equipped with a siphon tube or not.

Charge the liquid refrigerant with the cylinder in upright position.



Charge the liquid refrigerant with the cylinder in up-side-down position.



- Filling using a cylinder with a syphon attached.
- **Remark for R-134a:** Never recharge more than mentioned on factory name plate.

1.3.1 Important information regarding the refrigerant used

This product contains fluorinated greenhouse gases covered by the Kyoto Protocol. Do not vent gases into the atmosphere.

Refrigerant type: R-410A

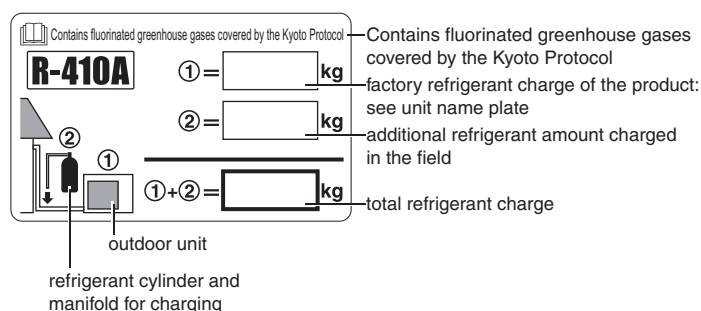
GWP⁽¹⁾ value: 1975

⁽¹⁾ GWP = global warming potential

Please fill in with indelible ink,

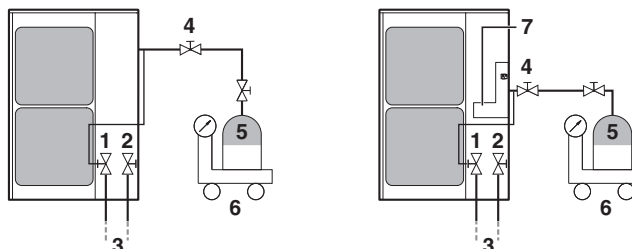
- ① the factory refrigerant charge of the product,
 - ② the additional refrigerant amount charged in the field and
 - ① + ② the total refrigerant charge
- on the refrigerant charge label supplied with the product.

The filled out label must be adhered in the proximity of the product charging port (e.g. onto the inside of the service cover).



1.3.2 Procedures for adding refrigerant

How to connect the tank?



- 1 Liquid line stop valve
- 2 Gas line stop valve
- 3 To indoor unit
- 4 Valve A
- 5 R-410A tank
- 6 Measuring instrument
- 7 Pipe fixing plate



Caution

- Automatic refrigerant charging is NOT POSSIBLE.
- Make sure to turn ON the power 6 hours before starting the operation. This is necessary to warm the crankcase by the electric heater.

Procedure: Charging while the outdoor unit is at a standstill

1. Determine the weight of refrigerant to be charged additionally.
Piping length is the one way length of gas or liquid piping whichever is the longest.

It is not necessary to charge additionally if the piping length is under 10 m.

If the piping length is over 10 m please determine the additional amount of refrigerant to be charged using the table below.

Table: Additional charging of refrigerant <unit: kg>

Refrigerant piping length				
3~10 m	10~20 m	20~30 m	30~40 m	40~50 m
(a)	0.54	1.08	1.62	2.16

(a) Additional charge not required

Complete recharging

In case complete recharging is required (after a leak, etc.), refer to the table below to determine the necessary amount of refrigerant.

Before recharging, make sure to execute vacuum drying of the internal piping of the unit as well. To do so, use the internal service port of the unit. Do NOT use the service ports located on the stop valve, since vacuum drying can not be performed properly from these ports.

Outdoor units have 1 port on the piping. It is between the heat exchanger and the 4-way valve.

Table: Total charging amount <unit: kg>

Refrigerant piping length				
3~10 m	10~20 m	20~30 m	30~40 m	40~50 m
4.5	5.0	5.6	6.1	6.7

2. After the vacuum drying is finished, open valve A (5) and charge the additional refrigerant in its liquid state through the service port on the liquid stop valve taking into account following instructions:
 - Turn on the power of the outdoor unit and indoor units.
 - Check that gas and liquid stop valves are closed.
 - Stop the compressor and charge the specified weight of refrigerant.



















- To avoid compressor breakdown. Do not charge the refrigerant more than the specified amount.

1.3.3 Check Operation





- During check operation, mount front panel to avoid misjudging.
- Check operation is mandatory for normal unit operation.
- During this check operation different temperature should be read out.
- A procedure for space heating and domestic water heating should be followed.
- If forced operation should be started during a test operation, the test run will be aborted.

Temperature read-out mode



On the remote controller, the actual temperatures can be displayed.

1. Push and hold the  button for 5 seconds.
The leaving water temperature is displayed (icons  and  and  are blinking).
2. Use the  and  buttons to display:
 - The entering water temperature (icons  and  are blinking and the  icon is flashing slowly).
 - The indoor temperature (icons  and  are blinking).
 - The outdoor temperature (icons  and  are blinking).
 - The hot water supply tank temperature (icons  and  are blinking).
3. Push the  button again to leave this mode. If no button is pressed, the remote controller leaves the display mode after 10 seconds.

Procedure for space heating

1. Check the leaving water and entering water temperature through the remote controller read-out mode and write down the displayed values. See "Temperature read-out mode" on page 84.
2. **Push the  button 4 times so the TEST icon will be displayed.**
3. Perform the test as follows (when no action is performed, the user interface will return to normal mode after 10 seconds or by pressing the  button once):
To test the space heating operation push the  button to start the test run operation.
4. The test run operation will end automatically after 30 minutes or when reaching the set temperature. The test run operation can be stopped manually by pressing the  button once. If there are misconnections or malfunctions, an error code will be displayed on the user interface. Otherwise, the user interface will return to normal operation.
5. To resolve the error codes, see "Error codes".
6. Check the leaving water and entering water temperature through the remote controller read-out mode and compare them with the values noted with step 1. After 20 minutes of operation an increase of the values should confirm the space heating operation.

Procedure for domestic water heating

1. Check the domestic hot water tank temperature through the remote controller read-out mode. See "Temperature read-out mode" on page 84.
2. **Push the  button for 5 seconds.**
The  icon will start blinking with 1 second intervals.
3. Keep the unit operating for 20 minutes and check the domestic hot water tank temperature through the remote controller again.
An increase of the value with 5°C should confirm the domestic water heating operation.
4. The operation will stop if the tank storage temperature has been reached.

1.4 Operation when Power is Turned On

1.4.1 When Turning On Power First Time

The unit cannot be run for up to 12 minutes to automatically set the master power and address (indoor-outdoor address, etc.).

Status

Outdoor unit

Test lamp H2P & H8P Blinks

Can also be set during operation described above.

Indoor unit

If ON button is pushed during operation described above, the “UH” malfunction indicator blinks.

(Returns to normal when automatic setting is complete.)

1.4.2 When Turning On Power the Second Time and Subsequent

Tap the RESET(BS5) button on the outdoor unit PC board. Operation becomes possible for about 2 minutes. If you do not push the RESET button, the unit cannot be run for up to 10 minutes to automatically set master power.

Status

Outdoor unit

Test lamp H2P & H8P Blinks

Can also be set during operation described above.

Indoor unit

If ON button is pushed during operation described above, the operation lamp lights but the compressor does not operate. (Returns to normal when automatic setting is complete.)

1.4.3 When an Indoor or Outdoor Unit PC Board has been Changed

Be sure to push and hold the RESET button for 5 seconds. If not, the addition cannot be recognized. In this case, the unit cannot be run for up to 12 minutes to automatically set the address (indoor-outdoor address, etc.)

Status

Outdoor unit

Test lamp H2P & H8P Blinks

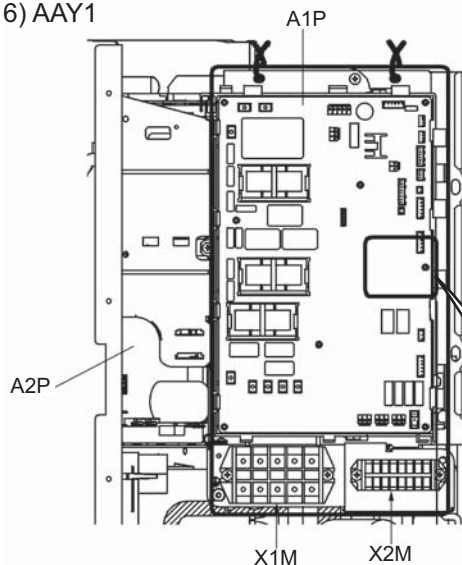
Can also be set during operation described above.

Indoor unit

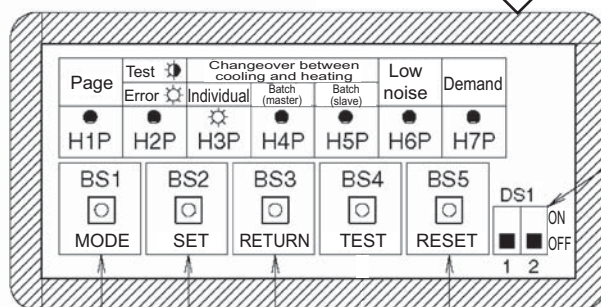
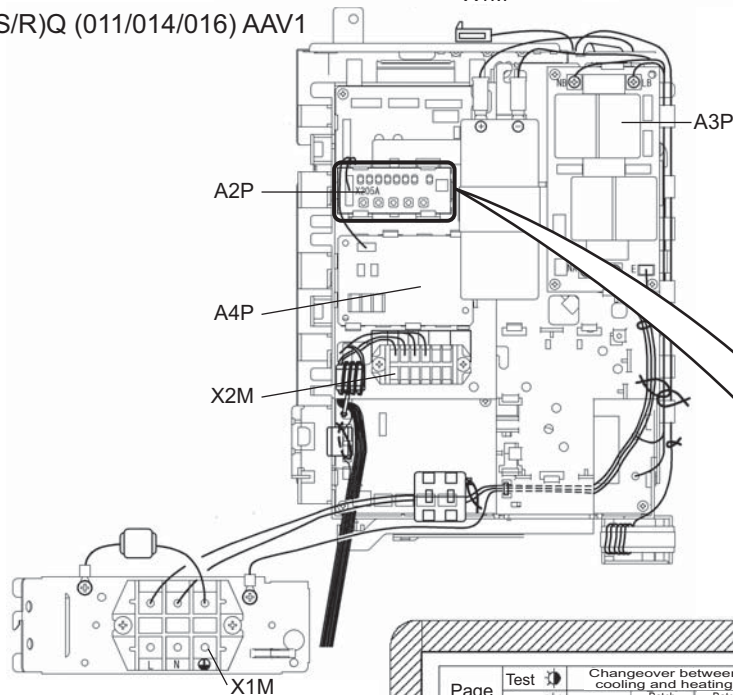
If ON button is pushed during operation described above, the “UH” or “U4” malfunction indicator blinks. (Returns to normal when automatic setting is complete.)

2. Outdoor Unit PC Board Layout

ER(S/R)Q (011/014/016) AAY1



ER(S/R)Q (011/014/016) AAV1



DIP switches
(DS1-1 and DS1-2)

Sets the address again when the wiring is changed or an indoor unit is added.

Used at field set.

Changes the set mode.

LED indicator status ● : Turn off ☀ : Turn on ☾ : Flicker ✱ : Turn on or off

(The LED indicator status shown at left indicates the status at factory set.)

3. Field Setting

3.1 Field Setting from remote control

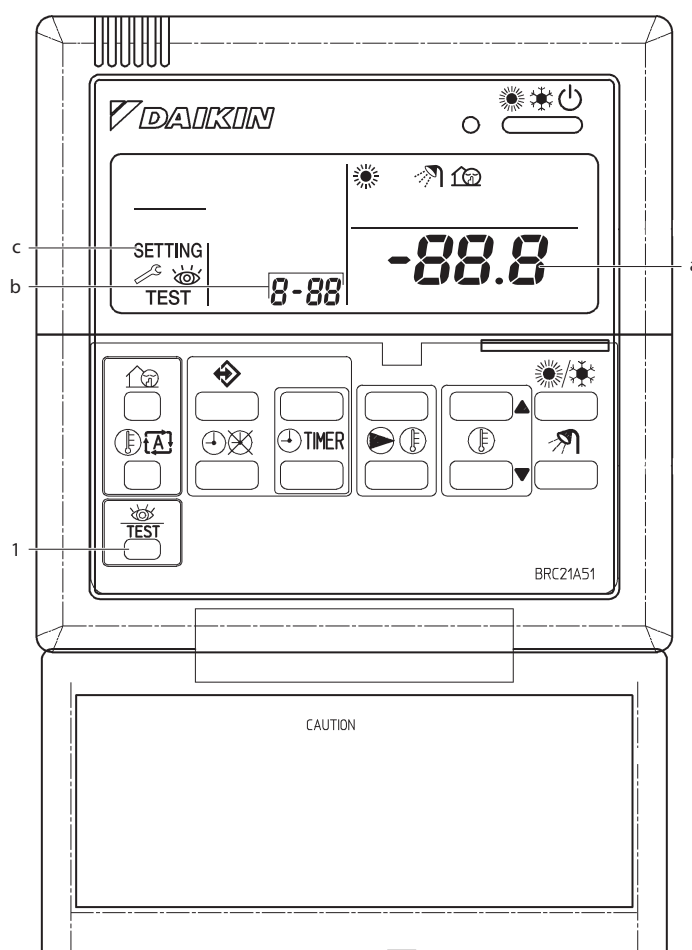
Individual function of indoor unit can be changed from the remote control. At the time of installation or after service inspection / repair, make the local setting in accordance with the following description. Wrong setting may cause malfunction.

(When optional accessory is mounted on the indoor unit, setting for the indoor unit may be required to change. Refer to information in the option handbook.)

3.1.1 Wired remote control

EKRUAHTA(BRC21A51)





EKRUAHTB(BRC21A52))



To change one or more field settings, proceed as follows.

1. Press the button for a minimum of 5 seconds to enter FIELD SET MODE.
The **SETTING** icon (c) will be displayed. The current selected field setting code is indicated **8-88** (b), with the set value displayed to the right **-88.8** (a).
2. Press the button to select the appropriate field setting first code (8-).
3. Press the button to select the appropriate field setting second code (-88).
4. Press the button and button to change the set value of the select field setting.
5. Save the new value by pressing the button.
6. Repeat step 2 through 4 to change other field settings as required.
7. When finished, press the button to exit FIELD SET MODE.

**Notes :**

1. Changes made to a field setting are only stored when the  button is pressed. Pressing the  button, without pressing the  button before, will discard the change made.
2. When you save a field setting by pressing the  button, the complete field setting group will be saved. For example, when you save field setting 8-00, the other field settings of group 8 (8-01, 8-02, 8-03, 8-04) will be saved as well.
3. Before shipping, the set values have been set as shown in the field settings table.
4. When exiting FIELD SET MODE, "88" may be displayed on the remote controller LCD while the unit initializes itself.
5. When running through the field settings you may notice that there are some more field settings as mentioned in the field settings table. **THESE SETTINGS ARE NOT APPLICABLE AND MAY NOT BE CHANGED!**
6. If you want to leave the setting mode without saving, press the test button.

3.1.2 Setting Contents and Code No. – EKHBRD – Indoor unit

EKHBRD*AA

First code	Second code	Setting name	Installer setting at variance with default value				Default value	Range	Step	Unit
			Date	Value	Date	Value				
0	Remote control setup									
	00	User permission level					2	2~3	1	—
	01	Room temperature compensation value					0	−5~5	0.5	°C
	02	Not applicable. Do not change the default value.					1 (ON)	0/1	—	—
	03	Status: space heating schedule timer mode					1 (ON)	0/1	—	—
1	Automatic storage timing for domestic water heating									
	00	Status: night time storage					1 (ON)	0/1	—	—
	01	Night time storage start time					1:00	0:00~23:00	1:00	hour
	02	Status: day time storage					0 (OFF)	0/1	—	-
	03	Day time storage start time					15:00	0:00~23:00	1:00	hour
2	Automatic setback function									
	00	Status: setback operation					1 (ON)	0/1	—	—
	01	Setback operation start time					23:00	0:00~23:00	1:00	hour
	02	Setback operation stop time					5:00	0:00~23:00	1:00	hour
3	Weather dependent set point									
	00	Low ambient temperature (Lo_A)					−10	−20~5	1	°C
	01	High ambient temperature (Hi_A)					15	10~20	1	°C
	02	Set point at low ambient temperature (Lo_Ti)					70	25~80	1	°C
	03	Set point at high ambient temperature (Hi_Ti)					45	25~80	1	°C
4	Disinfection function									
	00	Status: disinfection operation					1 (ON)	0/1	—	—
	01	Disinfection operation day selection					Fri	Mon~Sun	—	—
	02	Disinfection operation start time					23:00	0:00~23:00	1:00	hour
5	Automatic setback and disinfection set point									
	00	Set point: disinfection operation temperature					70	60~70	5	°C
	01	Disinfection operation time duration					10	5~60	5	min
	02	Leaving water setback temperature					5	0~10	1	°C
	03	Room setback temperature					18	17~23	1	°C
6	Option setup									
	00	Domestic hot water tank installed					0 (OFF)	0/1	—	—
	01	Optional room thermostat installed					0 (OFF)	0/1	—	—
	02	Backup heater kit activation					0 (OFF)	0/1	—	—
	03	Solar kit activation					0 (OFF)	0/1	—	—
	04	Benefit kWh power supply mode					0	0/2	1	—

			Installer setting at variance with default value							
First code	Second code	Setting name	Date	Value	Date	Value	Default value	Range	Step	Unit
7	Option setup									
	00	Optional bottom plate heater installed					0 (OFF)	0/1	—	—
	01	Not applicable. Do not change the default value.					0 (OFF)	0/1	—	—
	02	Multiple set point pattern					0 (A)	0/1	—	—
	03	Multiple set point 1					0 (OFF)	0/1	—	—
	04	Multiple set point 2					0 (OFF)	0/1	—	—
8	Option setup									
	00	Remote controller temperature control					1 (ON)	0/1	—	—
	01	Status: automatic restart function					1 (ON)	0/1	—	—
	02	Emergency mode					0 (OFF)	0/1	—	—
	03	Status: low noise level					1	1~3	1	—
	04	Status: freeze up prevention					0	0~2	1	—
9	Automatic temperature compensation									
	00	Leaving water temperature compensation value					0	-5~5	0.5	°C
	01	Domestic hot water tank compensation value					0	-5~5	0.5	°C
	02	Thermo ON/OFF admission					0	-5~5	0.5	°C
A	Option setup									
	00	Not applicable. Do not change the default value.					0	0~2	1	—
	01	Not applicable. Do not change the default value.					0	0~2	1	—
	02	Set point: required temperature difference for leaving and returning water					10	5~15	1	°C
	03	Set point: multiple set point 1 required temperature value					35	25~80	1	°C
	04	Set point: multiple set point 2 required temperature value					65	25~80	1	°C
B	Domestic hot water set points									
	00	Set point: reheat minimum temperature					35	35~65	1	°C
	01	Set point: reheat maximum temperature					45	35~75	1	°C
	02	Status: weather dependent domestic water heating					1 (ON)	0/1	—	—
	03	Set point: storage temperature					70	45~75	1	°C

			Installer setting at variance with default value							
First code	Second code	Setting name	Date	Value	Date	Value	Default value	Range	Step	Unit
C	Leaving water temperature limits									
	00	Set point: leaving water maximum temperature					80	37~80	1	°C
	01	Set point: leaving water minimum temperature					25	25~37	1	°C
	02	Not applicable. Do not change the default value.					20	18~22	1	°C
	03	Not applicable. Do not change the default value.					5	5~18	1	°C
D	Domestic water heating retention times									
	00	Set point: minimum time for domestic water heating					10	5~20	1	—
	01	Set point: maximum time for domestic water heating					30	10~60	5	—
	02	Set point: interval minimum stop time of domestic water heating					15	5~30	5	—
E	Service mode									
	00	Vacuum mode					0	0/1	—	—
	01	Not applicable. Do not change the default value.					0 (OFF)	0/1	—	—
	02	Not applicable. Do not change the default value.					0 (OFF)	0/1	—	—
	03	Not applicable. Do not change the default value.					1	0~2	1	—
	04	Pump only operation					0	0~2	1	—

EKHBRD*AB/AC

First code	Second code	Setting name	Installer setting at variance with default value				Default value	Range	Step	Unit
			Date	Value	Date	Value				
0	Remote control setup									
	00	User permission level					2	2~3	1	—
	01	Room temperature compensation value					0	-5~5	0.5	°C
	02	Not applicable. Do not change the default value.					1 (ON)	0/1	—	—
	03	Status: space heating schedule timer mode					1 (ON)	0/1	—	—
1	Automatic storage timing for domestic water heating									
	00	Status: night time storage					1 (ON)	0/1	—	—
	01	Night time storage start time					1:00	0:00~23:00	1:00	hour
	02	Status: day time storage					0 (OFF)	0/1	—	—
	03	Day time storage start time					15:00	0:00~23:00	1:00	hour
2	Automatic setback function									
	00	Status: setback operation					1 (ON)	0/1	—	—
	01	Setback operation start time					23:00	0:00~23:00	1:00	hour
	02	Setback operation stop time					5:00	0:00~23:00	1:00	hour
3	Weather dependent set point									
	00	Low ambient temperature (Lo_A)					-10	-20~5	1	°C
	01	High ambient temperature (Hi_A)					15	10~20	1	°C
	02	Set point at low ambient temperature (Lo_Ti)					70	25~80	1	°C
	03	Set point at high ambient temperature (Hi_Ti)					45	25~80	1	°C
4	Disinfection function									
	00	Status: disinfection operation					1 (ON)	0/1	—	—
	01	Disinfection operation day selection					Fri	Mon~Sun	—	—
	02	Disinfection operation start time					23:00	0:00~23:00	1:00	hour
5	Automatic setback and disinfection set point									
	00	Set point: disinfection operation temperature					70	60~70	5	°C
	01	Disinfection operation time duration					10	5~60	5	min
	02	Leaving water setback temperature					5	0~10	1	°C
	03	Room setback temperature					18	17~23	1	°C
6	Option setup									
	00	Domestic hot water tank installed					0 (OFF)	0/1	—	—
	01	Optional room thermostat installed					0 (OFF)	0/1	—	—
	02	Backup heater kit activation					0 (OFF)	0/1	—	—
	03	Solar kit activation					0 (OFF)	0/1	—	—
	04	Benefit kWh power supply mode					0	0/2	1	—
7	Option setup									
	00	Optional bottom plate heater installed					1 (ON)	0/1	—	—
	01	Not applicable. Do not change the default value.					0 (OFF)	0/1	—	—
	02	Multiple set point pattern					0 (A)	0/1	—	—
	03	Multiple set point 1					0 (OFF)	0/1	—	—
	04	Multiple set point 2					0 (OFF)	0/1	—	—

First code	Second code	Setting name	Installer setting at variance with default value				Default value	Range	Step	Unit
			Date	Value	Date	Value				
8	Option setup									
	00	Remote controller temperature control					1 (ON)	0/1	—	—
	01	Backup heater kit optional setting					1 (ON)	0/1	—	—
	02	Emergency mode					0 (OFF)	0/1	—	—
	03	Status: low noise level					1	1~3	1	—
	04	Status: freeze up prevention					0	0~2	1	—
9	Automatic temperature compensation									
	00	Leaving water temperature compensation value					0	−5~5	0.5	°C
	01	Domestic hot water tank compensation value					0	−5~5	0.5	°C
	02	Thermo ON/OFF admission					0	−5~5	0.5	°C
A	Option setup									
	00	Current limitation					0	0~2	1	—
	01	Not applicable. Do not change the default value.					0	0~2	1	—
	02	Set point: required temperature difference for leaving and returning water					10	5~15	1	°C
	03	Set point: multiple set point 1 required temperature value					35	25~80	1	°C
	04	Set point: multiple set point 2 required temperature value					65	25~80	1	°C
B	Domestic hot water set points									
	00	Set point: reheat minimum temperature					35	35~65	1	°C
	01	Set point: reheat maximum temperature					45	35~75	1	°C
	02	Status: weather dependent domestic water heating					1 (ON)	0/1	—	—
	03	Set point: storage temperature					70	45~75	1	°C
	04	Automatic maximum domestic hot water storage temperature					70	55~75	1	°C
C	Leaving water temperature limits									
	00	Set point: leaving water maximum temperature					80	37~80	1	°C
	01	Set point: leaving water minimum temperature					25	25~37	1	°C
	02	Not applicable. Do not change the default value.					20	18~22	1	°C
	03	Not applicable. Do not change the default value.					5	5~18	1	°C
D	Domestic water heating retention times									
	00	Set point: minimum time for domestic water heating					10	5~20	1	—
	01	Set point: maximum time for domestic water heating					30	10~60	5	—
	02	Set point: interval minimum stop time of domestic water heating					15	5~30	5	—
E	Service mode									
	00	Vacuum mode					0	0/1	—	—
	01	Not applicable. Do not change the default value.					0 (OFF)	0/1	—	—
	02	Not applicable. Do not change the default value.					0 (OFF)	0/1	—	—
	03	Not applicable. Do not change the default value.					1	0~2	1	—
	04	Pump only operation					0	0~2	1	—

3.1.3 Detailed Explanation of Setting Modes

[0] Remote control setup





First code	Second code	Setting name	Default value	Range	Step	Unit
0	Remote control setup					
	00	User permission level	2	2~3	1	—
	01	Room temperature compensation value	0	-5~5	0.5	°C
	03	Status: space heating schedule timer mode	1 (ON)	0/1	—	—

■ [0-00] User permission level

The remote controller can be programmed to make certain buttons and functions unavailable for the user. There are 2 permission levels defined. Both levels (level 2 and level 3) are basically the same, the only difference is that for level 3 no water temperature settings are possible (see table below).

	Permission	
	level 2	level 3
Operation ON/OFF	Operable	Operable
Domestic water heating operation ON/OFF	Operable	Operable
Setting the leaving water temperature	Operable	—
Setting the room temperature	Operable	Operable
Quiet mode ON/OFF	—	—
Weather dependent set point operation ON/OFF	Operable	—
Setting the clock	—	—
Programming the schedule timer	—	—
Schedule timer operation ON/OFF	Operable	Operable
Field settings	—	—
Error code display	Operable	Operable
Test operation	—	—

By default no level is defined so all buttons and functions are operable (no level enabled). The actual permission level is determined by field setting. For permission level 2, set field setting [0-00] is to 2, for permission level 3, set field setting [0-00] to 3.

Once the field setting is set, the chosen permission level is not yet active. Enabling the selected permission level is done by simultaneously pressing buttons  and  immediately followed by simultaneously pressing buttons  and , and keeping all 4 buttons pressed for at least 5 seconds. Note that no indication on the remote controller is given. After the procedure the blocked buttons will not be available anymore.

Deactivating the selected permission level is done on the same way. Here the default level becomes active again. All buttons and functions are operable.

■ [0-01] Room temperature compensation value

If needed, it is possible to adjust some thermistor value of the unit by a correction value. This can be used as countermeasure for thermistor tolerances or capacity shortage.

The compensated temperature (= measured temperature plus compensation value) is then used for controlling the system and will be displayed in the temperature read-out mode. See also "[9] Automatic temperature compensation" setting for compensation values for leaving water temperature and domestic hot water temperature.


■ [0-03] Status: defines whether the ON/OFF instruction can be used in the schedule timer for space heating.

The schedule timer for space heating can be programmed on 2 different ways: based on the temperature set point (both leaving water temperature and room temperature) and based on the ON/OFF instruction.





Notes : By default space heating based on temperature set point (method 1) is enabled, so only temperature shifts

are possible (no ON/OFF instruction). The system keeps operating.

Advantage of this method is that you can simply switch off the space heating operation by pushing the  button without disabling the automatic domestic hot water storage operation (e.g. during summertime when no space heating is required).

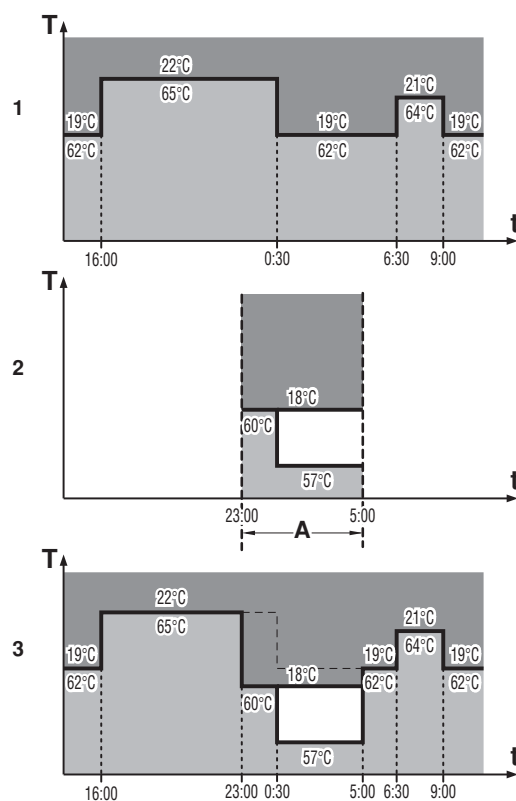
In the following tables both methods on how to interpret the schedule timer are shown.



Method 1	Space heating based on temperature set point ^(a)
During operation	During schedule timer operation the operation LED is lit continuously.
When pushing the  button	The schedule timer for space heating will stop and will not start again. The controller will be switched off (operation LED will stop working). However, the schedule timer icon will stay displayed which means that the domestic water heating stays enabled.
When pushing the  button	The schedule timer for space heating and domestic water heating along with the quiet mode will be stopped and will not start again. The schedule timer icon will not be displayed anymore.

(a) For leaving water temperature and/or room temperature see leaving water temperature control (setting 8-00).

Operation example: Schedule timer based on temperature set points.

When setback function is enabled, the setback operation will have priority over the scheduled action in the schedule timer setting 2.



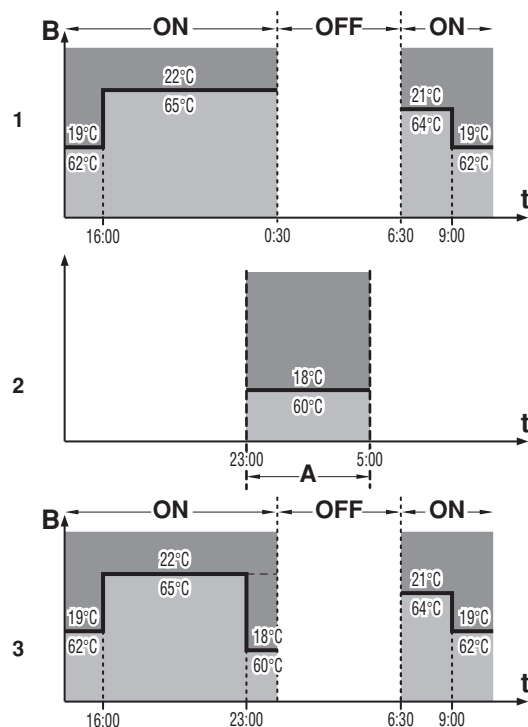
- 1 Schedule timer
- 2 Setback function
- 3 When both setback function and schedule timer are enabled
- A Setback function
- t Time
- T Temperature set point
-  Room temperature
-  Leaving water temperature

Remark: Room temperature and leaving water temperature have no fix relationship. Both temperatures can be adjusted independently.

Method 2	Space heating based on ON/OFF instruction
During operation	When the schedule timer switches space heating OFF, the controller will be switched off (operation LED will stop working). Note that this has no influence on the domestic water heating.
When pushing the **⏸ button	<p>The schedule timer for space heating will stop (when active at that moment) and will start again at the next scheduled ON function.</p> <p>The "last" programmed command overrides the "preceding" programmed command and will remain active until the "next" programmed command occurs.</p> <p>Example: imagine the actual time is 17:30 and actions are programmed at 13:00, 16:00 and 19:00. The "last" programmed command (16:00) overruled the "previous" programmed command (13:00) and will remain active until the "next" programmed command (19:00) occurs.</p> <p>So in order to know the actual setting, one should consult the last programmed command. It is clear that the "last" programmed command may date from the day before. Refer to the operation manual.</p> <p>The controller will be switched off (operation LED will stop working).</p> <p>However the schedule timer icon will stay displayed which means that the domestic heating stays enabled.</p>
When pushing the ⏸/⏹ button	<p>The schedule timer for space heating and domestic water heating along with the quiet mode will be stopped and will not start again.</p> <p>The schedule timer icon will not be displayed anymore.</p>

Operation example: Schedule timer based on ON/OFF instruction.

When setback function is enabled, the setback operation will have priority over the scheduled action in the schedule timer if ON instruction is active. If OFF instruction is active this will have priority over the setback function. At any time the OFF instruction will have the highest priority.



- 1 Schedule timer
- 2 Setback function
- 3 When both setback function and schedule timer are enabled

A Setback function
B ON/OFF instruction

t Time
T Temperature set point

Room temperature
Leaving water temperature

[1] Automatic storage timing for domestic water heating

First code	Second code	Setting name	Default value	Range	Step	Unit
1	Automatic storage timing for domestic water heating					
	00	Status: night time storage	1 (ON)	0/1	—	—
	01	Night time storage start time	1:00	0:00~23:00	1:00	hour
	02	Status: day time storage	0 (OFF)	0/1	—	—
	03	Day time storage start time	15:00	0:00~23:00	1:00	hour

In this mode, the indoor unit will deliver hot water to the domestic hot water tank based on the daily fixed pattern. This mode will continue until storage temperature is reached, no times are involved.

Automatic storage is the advised domestic hot water mode. In this mode water heats up during the night (when space heating requirements are lower) until the storage set point. The heated water is stored in the domestic hot water tank at a higher temperature so it can fulfil the domestic hot water requirements throughout the day.

The storage temperature set point and timing are field settings.

- **[1-00]** Status: defines whether the domestic water heating (storage mode) during night is enabled (1) or not (0).
- **[1-01]** Start time: time of the night at which the domestic water should be heated. The ending time will variate for each system.
- **[1-02]** Status: defines whether the domestic water heating (storage mode) during daytime is enabled (1) or not (0).
- **[1-03]** Start time: time of the day at which the domestic water should be heated. The ending time will variate for each system.



Notes :

- Make sure the domestic hot water is only heated up to the domestic hot water temperature you require.
Start with a low domestic hot water storage temperature set point, and only increase if you feel that the domestic hot water supply temperature is not sufficient for your needs (this depends on your water using pattern).
- Make sure the domestic hot water is not heated unnecessary. Start with activating automatic storage during night (default setting). If it seems that the domestic hot water night storage operation is not sufficient for your needs, an additional storage during daytime can be set.
- For energy-saving purposes, it is advised to enable the weather dependent domestic water heating. Refer to setting "[b-02] Status: defines whether the weather dependent domestic water heating is turned ON (1) or OFF (0)." on page 110.
- Manual storage is possible: to activate push 5 seconds on the button. The icon starts to blink, the water will be heated up till storage set point (one time action). It can also be stopped manually by pushing the button.
- Be aware that despite the automatic storage is a pre-programmed schedule timer, it is only active when the schedule timer is enabled. This means that you have to push the button and confirm that the is displayed to make sure that the automatic storage will operate.

Refer to "[b] Domestic hot water set points" for temperature set points.

[2] Automatic setback function

First code	Second code	Setting name	Default value	Range	Step	Unit
2	Automatic setback function					
	00	Status: setback operation	1 (ON)	0/1	—	—
	01	Setback operation start time	23:00	0:00~23:00	1:00	hour
	02	Setback operation stop time	5:00	0:00~23:00	1:00	hour

Setback function provides the possibility to lower the room temperature. The setback function can for instance be activated during the night because the temperature demands during night and day are not the same.

**Notes :**

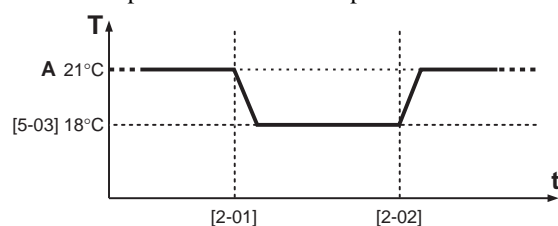
1. By default the setback function is enabled, if it's not needed, it should be disabled.
2. The setback function can be combined with the automatic weather dependent set point operation.
3. Setback function is an automatic daily scheduled function.
4. It is advised to set the start time of automatic storage during night [1-01] on the moment that the setback function starts [2-01].

■ [2-00] Status: defines whether the setback function is turned ON (1) or OFF (0)

■ [2-01] Start time: time at which setback is started

■ [2-02] Stop time: time at which setback is stopped

* Setback operation for room temperature control



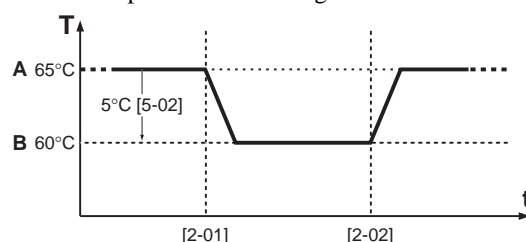
A Normal room temperature set point

t Time

T Temperature

[5-03] Room setback temperature (actual temperature)

* Setback operation for leaving water control



A Normal leaving water temperature set point

B Leaving water setback temperature

t Time

T Temperature

[5-02] Leaving water setback value (shift value)

**Notes :**

1. In setback operation for room temperature control, immediately a setback temperature is set.
2. In setback operation for leaving water control, a shift down value is chosen. This value should be lowered from the normal set point.

[3] Weather dependent set point

First code	Second code	Setting name	Default value	Range	Step	Unit
3	Weather dependent set point					
	00	Low ambient temperature (Lo_A)	-10	-20~5	1	°C
	01	High ambient temperature (Hi_A)	15	10~20	1	°C
	02	Set point at low ambient temperature (Lo_Ti)	70	25~80	1	°C
	03	Set point at high ambient temperature (Hi_Ti)	45	25~80	1	°C

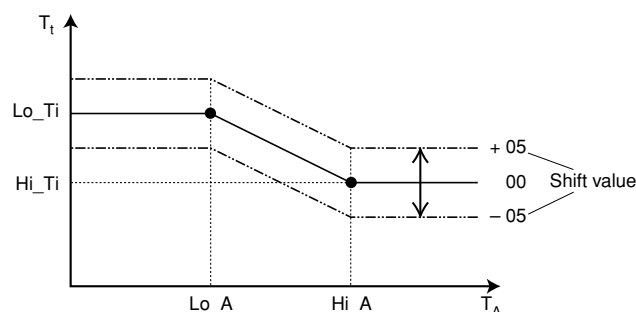
When weather dependent operation is active, the leaving water temperature is determined automatically depending on the outdoor temperature: colder outdoor temperatures will result in warmer water and vice versa. The unit has a floating set point. Activating this operation will result in a lower power consumption than use with a manually fixed leaving water set point.

During weather dependent operation, the user has the possibility to shift up or down the target water temperature by a maximum of 5°C. This "Shift value" is the temperature difference between the temperature set point calculated by the controller and the real set point. E.g. a positive shift value means that the real temperature set point will be higher than the calculated set point.

It is advised to use the weather dependent set point because it adjusts the water temperature to the actual needs for space heating. It will prevent the unit from switching too much between thermo ON operation and thermo OFF operation when using the remote controller room thermostat or external room thermostat.



Note : During this operation, instead of showing the water temperature set point, the controller shows the shift value which can be set by the user.



T_t Target water temperature

T_A Ambient (outdoor) temperature

Shift value = Shift value

- [3-00] Low ambient temperature (Lo_A): low outdoor temperature.
- [3-01] High ambient temperature (Hi_A): high outdoor temperature.
- [3-02] Set point at low ambient temperature (Lo_Ti): the target outgoing water temperature when the outdoor temperature equals or drops below the low ambient temperature (Lo_A).
Note that the Lo_Ti value should be higher than Hi_Ti, as for colder outdoor temperatures (i.e. Lo_A) warmer water is required.
- [3-03] Set point at high ambient temperature (Hi_Ti): the target outgoing water temperature when the outdoor temperature equals or rises above the high ambient temperature (Hi_A).

Note that the Hi_Ti value should be lower than Lo_Ti, as for warmer outdoor temperatures (i.e. Hi_A) less warm water suffices.



Note : If by mistake the value of [3-03] is set higher than the value of [3-02], the value of [3-03] will always be used.

[4] Disinfection function

First code	Second code	Setting name	Default value	Range	Step	Unit
4	Disinfection function					
	00	Status: disinfection operation	1 (ON)	0/1	—	—
	01	Disinfection operation day selection	Fri	Mon~Sun	—	—
	02	Disinfection operation start time	23:00	0:00~23:00	1:00	hour

This mode will disinfect the domestic hot water tank by periodically heating the domestic water to a specific temperature.



Note : If a domestic hot water tank is installed, the disinfection function is enabled by default.

- [4-00] Status: defines whether the disinfection function is turned ON (1) or OFF (0).
- [4-01] Operation interval: day of the week at which the domestic water should be heated.
- [4-02] Start time: time at which the disinfection operation is started.

Even if all schedule timers are de-activated and there is no reheat function active, the disinfection function will operate if a domestic hot water tank is installed and field setting [4-00] is set to ON.



The disinfection function field settings must be configured by the installer according to national and local regulations.

Refer to “[5] Automatic setback and disinfection set point” on page 102 for temperature set points.



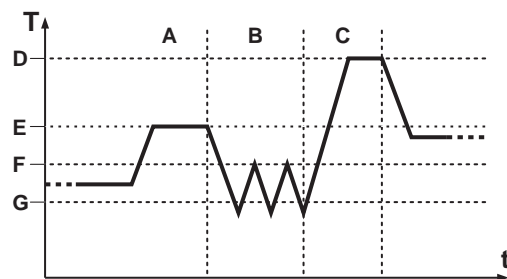
Note : This function may be disabled if the set point storage temperature is higher than the disinfection set point.

[5] Automatic setback and disinfection set point

First code	Second code	Setting name	Default value	Range	Step	Unit
5	Automatic setback and disinfection set point					
	00	Set point: disinfection operation temperature	70	60~75	5	°C
	01	Disinfection operation time duration	10	5~60	5	min
	02	Leaving water setback temperature	5	0~10	1	°C
	03	Room setback temperature	18	17~23	1	°C

See also “[4] Disinfection function” on page 101 for more information about the disinfection operation.

- [5-00] Set point: disinfection water temperature to be reached.
- [5-01] Interval: time period defining how long the disinfection temperature set point should be maintained.



- A Storage operation (if activated)
- B Reheat operation (if activated)
- C Disinfection operation (if activated)

Field settings

- D Disinfection operation temperature [5-00] (e.g. 70°C)
- E Hot water storage temperature [b-03] (e.g. 60°C)
- F Reheat maximum water temperature [b-01] (e.g. 45°C)
- G Reheat minimum water temperature [b-00] (e.g. 35°C)
- t Time
- T Domestic hot water tank temperature

**Notes :**

1. Reheat temperature should have lower value than storage temperature.
2. If storage temperature is higher than the disinfection temperature and if this value is high enough according national and local regulations, you can disable the disinfection function.

- [5-02] Leaving water setback temperature.
- [5-03] Room setback temperature.

**Note :**

More details about setback function can be found in setting [2].

[6] Option setup

First code	Second code	Setting name	Default value	Range	Step	Unit
6	Option setup					
	00	Domestic hot water tank installed	0 (OFF)	0/1	—	—
	01	Optional room thermostat installed	0 (OFF)	0/1	—	—
	04	Benefit kWh power supply mode	0	0/2	1	—

■ **[6-00] Domestic hot water tank option**

If the domestic hot water tank is installed, its operation must be enabled by field setting. Default [6-00] = 0 which means no tank is installed. Set [6-00] to 1 if the optional domestic hot water tank is installed.



Note : When enabling the domestic hot water tank option be aware that the advised default settings become active:

- **[1-00]** = 1 = automatic night storage
- **[4-00]** = 1 = disinfection function

■ **[6-01] External room thermostat option**

If the optional external room thermostat is installed, its operation must be enabled by field setting. Default [6-01] = 0, which means no external room thermostat is installed. Set [6-01] to 1 if the optional external room thermostat is installed.

The external room thermostat only gives an ON/OFF signal to the heat pump based on the room temperature. Because it does not give continuous feedback information to the heat pump, it is supplementary to the remote controller room thermostat function. To have a good control of the system and avoiding frequent ON/OFF it is advised to use the automatic weather dependent set point operation.



Note : By using an external room thermostat, the smart logic of the standard remote controller is overruled.

■ **[6-02] Heater kit**

Once installed, you can activate the heater kit by changing field setting [6-02]=1.

From that moment on, the heat pump system will take the heater kit into account whilst deciding operation. When the heater is actually operating, the heater symbol is shown on the remote controller. There is no step 1-2 indication.

For more information see “Part 9 - External Backup Heater Kit” on page 255.

■ **[6-03] Solar support**

For more information refer to the EKHWP installation manual.

■ **[6-04] Benefit kWh rate power supply mode**

If benefit kWh rate power supply is used, the mode must be selected. Default [6-04] = 0 which means no benefit kWh rate power supply is used.

Set [6-04] to 1 to use benefit kWh rate power supply mode 1 (normally closed contact which will open when the power supply is interrupted), or set [6-04] to 2 to use benefit kWh rate power supply mode 2 (normally opened contact which will close when the power supply is interrupted).

[7] Option setup

First code	Second code	Setting name	Default value	Range	Step	Unit
7	Option setup					
	00	Optional bottom plate heater installed	0 (OFF)	0/1	—	—
	02	Multiple set point pattern	0 (A)	0/1	—	—
	03	Multiple set point 1	0 (OFF)	0/1	—	—
	04	Multiple set point 2	0 (OFF)	0/1	—	—

■ [7-00] Bottom plate heater option

An optional bottom plate heater can be installed in your outdoor unit. In case an ERRQ* outdoor unit (special model with freeze-up countermeasures) is installed, the unit will have the bottom plate heater already standard installed.

If the bottom plate heater is installed, its operation must be enabled by field setting. Default [7-00] = 0 which means no bottom plate heater is installed. Set [7-00] to 1 if the bottom plate heater is installed.

■ [7-02] Select multiple set point pattern A or B

■ Multi set point control according pattern A

During normal operation, domestic water heating and space heating modes are separated and activated intermittent to fulfil a simultaneous request. Therefor multiple set point pattern A can be configured to allow simultaneous domestic water and space heating without intermission.

■ Multi set point control according pattern B

The basic setup of multiple set point pattern B is the same as a normal classic design, so AGAIN no domestic water heating and space heating is possible simultaneously. Multiple set point pattern B is focussed on space heating operation and allows using multiple water set points in combination with the remote controller or external room thermostat. The configuration of pattern B allows space heating set points and the domestic hot water set point.

■ [7-03] Activation for multiple set point 1

■ [7-04] Activation for multiple set point 2

[8] Option setup

First code	Second code	Setting name	Default value	Range	Step	Unit
8	Option setup					
	00	Remote controller temperature control	1 (ON)	0/1	—	—
	01	Automatic restart function/Backup heater optional setting	1 (ON)	0/1	—	—
	02	Emergency operation	0 (OFF)	0/1	—	—
	03	Status: low noise level	1	1~3	1	—
	04	Status: freeze up prevention	0	0~2	1	—

■ **[8-00]** Remote controller temperature control - leaving water control

When using the remote control delivered with the unit, 2 types of temperature control are possible. Default [8-00] = 1 which means that the remote controller is used as room thermostat, so the remote controller can be placed in the living room to control the room temperature. Set [8-00] to 0 to use the unit in leaving water temperature control.



Notes :

1. In leaving water control: the heating will be activated as required by the water temperature set point. The set point can be set manually, through the schedule timer or weather dependent (automatic). The temperature range is between 25°C and 80°C and can be set by and buttons.
2. Leaving water control is not allowed when multi set point control according pattern B is used.

■ **[8-01]**

For EKHB RD*AA: [8-01] Auto restart. For EKHB RD*AB/AC auto restart can not be disabled.

When a power failure occurred and the power returns to the unit, the system will automatically restore it's settings and restart. This is the default setting [8-01] = 1. To disable this auto restart function, set [8-01] to 0.



Note :

When power returns after a power supply failure, the auto restart function reapplies the remote controller settings at the time of the power supply failure. It is therefore recommended to leave the auto restart function enabled. Note that with the function disabled the schedule timer will not be activated when power returns to the unit after a power supply failure. Press the button to enable the schedule timer again.

For EKHB RD*AB/AC: [8-01] Backup heater optional setting

[8-01]=0 (default)

During benefit kWh rate power supply mode the backup heater will not operate. No automatic heat pump operation stop is performed at lower ambient temperatures.

[8-01]=1

During benefit kWh rate power supply mode the backup heater will operate automatically in emergency mode. If the ambient temperatures is lower than -25°C, the heat pump operation will stop and the unit will automatically change to emergency operation.

For more information about the backup heater, refer to “Part 9 - External Backup Heater Kit” on page 255.

■ **[8-02]** Emergency mode

During emergency mode, heating is only done by the heater kit, not by the heat pump.

Activation of emergency mode is done by changing field setting [8-02]=1.

Activating the emergency mode will stop the heat pump operation. The pump of the indoor unit will be started, but heating itself is done by the heater kit. If there are no error conditions in leaving or returning water thermistor, the heater kit can start to follow emergency operation.



Note :

Before activating emergency operation, be sure to activate the heater kit. The heater will stay in emergency mode until the field setting is set back to default [8-02]=0.

■ [8-03] Quiet mode

The unit has a quiet mode functionality for which 3 levels can be selected:

- [8-03] = 1 low noise level 1 (default)
- [8-03] = 2 low noise level 2
- [8-03] = 3 low noise level 3

Activating this quiet mode is done by pushing the QUIET MODE button on the remote controller or through the schedule timer.

■ [8-04] Freeze-up prevention

The unit has a freeze-up prevention functionality for which 3 levels can be selected:

- [8-04] = 0 prevention level 0 (default: no prevention)
- [8-04] = 1 prevention level 1
- [8-04] = 2 prevention level 2

The freeze-up prevention is only active when the unit is in thermo OFF condition. If prevention level 1 is enabled, the freeze-up prevention will start if the outdoor ambient temperature $<4^{\circ}\text{C}$ and if leaving or return water temperature $<7^{\circ}\text{C}$. For prevention level 2, the freeze-up prevention will start as soon as the ambient temperature $<4^{\circ}\text{C}$.

For both cases the pump will operate and if leaving or return water $<5^{\circ}\text{C}$ for 5 minutes the unit will start up to prevent too low temperatures.

It is advised to enable freeze-up prevention if the indoor unit is located in a colder ambient room (e.g. garage, ...) to prevent water freeze-up.

[9] Automatic temperature compensation

First code	Second code	Setting name	Default value	Range	Step	Unit
9	Automatic temperature compensation					
	00	Leaving water temperature compensation value	0	-5~5	0.5	°C
	01	Domestic hot water tank compensation value	0	-5~5	0.5	°C
	02	Thermo ON/OFF admission	0	-5~5	0.5	°C

If needed, it is possible to adjust some thermistor value of the unit by a correction value. This can be used as countermeasure for thermistor tolerances or capacity shortage.

The compensated temperature (= measured temperature plus compensation value) is then used for controlling the system and will be displayed in the temperature read-out mode.

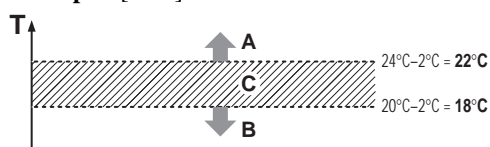
- [9-00] Leaving water temperature compensation value
- [9-01] Domestic hot water tank compensation value
- [9-02] Thermo ON/OFF admission

By changing this value the operation range for space heating operation can be modified.

If the ambient temperature becomes higher than (24°C + the value of [9-02]) no space heating is possible.

Space heating can be requested as long as the ambient temperature is lower than (20°C + the value of [9-02]).

Example: [9-02] = -2°C



- A** No space heating operation possible
- B** Request for space heating possible
- C** Hysteresis area
- T** Ambient temperature

[A] Option setup

First code	Second code	Setting name	Default value	Range	Step	Unit
A	Option setup					
	00	Current limitation	0	0~2	1	—
	02	Set point: required temperature difference for leaving and returning water	10	5~15	1	°C
	03	Set point: multiple set point 1 required temperature value	35	25~80	1	°C
	04	Set point: multiple set point 2 required temperature value	65	25~80	1	°C

■ [A-01] Current limitation

Setting	V1	Y1
[A-01]=0 (default)	23 A	13 A
[A-01]=1	18.4 A	10.4 A
[A-02]=2	15 A	8.5 A

The indoor unit current is limited, the outdoor unit is slave and will also reduce its power consumption consequentially. However transient conditions with higher power consumption are possible.

■ [A-02] Temperature difference for leaving and returning water

The unit is designed to support radiator operation. The advised leaving water temperature (set by the remote controller) for radiators is 65°C. In such a case the unit will be controlled to realize a temperature difference (ΔT) of 10°C, which means that the returning water to the unit is around 55°C. Depending on the installed application (radiators, fan coil units, ...) or situation, it can be required to change the ΔT . This can be done by changing field setting [A-02].

■ [A-03] Multi set point 1 temperature.

■ [A-04] Multi set point 2 temperature.



Notes :

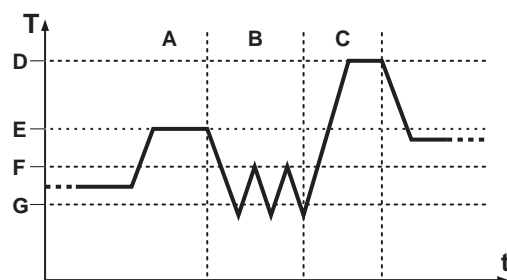
1. When temperature reducing devices are installed, the system can be configured to use multi set points, also the demand PCB (option) is needed.
2. The selected values for multiple set point should be lower than the value from remote controller (reference temperature) or domestic hot water temperature (pattern A).
3. Daikin does not offer any temperature reducing device (TRD). This system (multi set point control) only provides the possibility to use multi set point. It's than also the installers responsibility to make sure that the whole system is operating well.

[B] Domestic hot water set points

First code	Second code	Setting name	Default value	Range	Step	Unit
B	Domestic hot water set points					
	00	Set point: reheat minimum temperature	35	35~65	1	°C
	01	Set point: reheat maximum temperature	45	35~75	1	°C
	02	Status: weather dependent domestic water heating	1 (ON)	0/1	—	—
	03	Set point: storage temperature	70	45~75	1	°C
	04	Automatic maximum domestic hot water storage temperature	70	55~75	1	°C

The reheat mode will prevent the domestic hot water from cooling down lower than a certain temperature. When enabled the indoor unit will deliver hot water to the domestic hot water tank if the reheat minimum value is reached. The domestic water heating will continue until the reheat maximum temperature is reached. In this way always a minimum of domestic hot water is available.

- [b-00] Set point: reheat minimum temperature (see figure below).
- [b-01] Set point: reheat maximum temperature (see figure below).



- A Storage operation (if activated)
- B Reheat operation (if activated)
- C Disinfection operation (if activated)

Field settings

- D Disinfection operation temperature [5-00] (e.g. 70°C)
- E Hot water storage temperature [b-03] (e.g. 60°C)
- F Reheat maximum water temperature [b-01] (e.g. 45°C)
- G Reheat minimum water temperature [b-00] (e.g. 35°C)
- t Time
- T Domestic hot water tank temperature

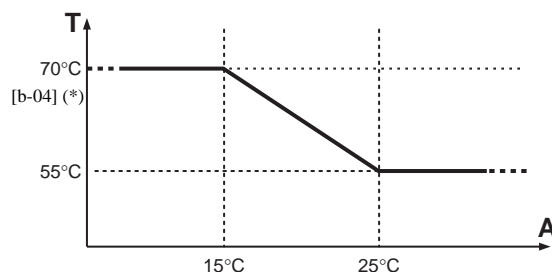
**Notes :**

- Remark that the icon will only be blinking during effective automatic storage operation. Presence of the permanently lit icon does not mean that automatic storage is enabled, but only means that reheat is enabled.
- During operation it is always possible to cancel the operation by pushing the button once.
- Pushing the button has no influence on the domestic water heating. Domestic hot water heating is only switched on or off by means of the button and/or disabling the storage schedule timer.

- **[b-02]** Status: defines whether the weather dependent domestic water heating is turned ON (1) or OFF (0).

If enabled, the storage set point will be set weather dependent.

In case of a higher ambient temperature (e.g. during summertime), the cold supply water to the mixing tap (e.g. shower, bath) will also have a higher temperature. This makes that the temperature of the hot water from the domestic hot water tank may be lower to reach the same water mixing temperature from the shower or bath mixing tap. In this way, with a lower domestic hot water tank temperature setting the comfort level can be kept the same but with a lower energy consumption.



A Ambient temperature

T Domestic hot water storage temperature

(*) For EKHDRD*AA: Fixed at 70°C

For EKHDRD*AB/AC: [b-04]



Note : The temperatures for weather dependent domestic water heating (see figure) are fixed and can not be changed.

- **[b-03]** Set point: storage temperature (see figure above)



Note : If weather dependent domestic water heating is enabled [b-02], the storage temperature will be set automatically and the field setting [b-03] will be of no importance.

- **[b-04]**

For EKHDRD*AA: Not applicable.

For EKHDRD*AB/AC: Automatic maximum domestic hot water storage temperature: default=70°C.

[C] Leaving water temperature limits

First code	Second code	Setting name	Default value	Range	Step	Unit
C	Leaving water temperature limits					
	00	Set point: leaving water maximum temperature	80	37~80	1	°C
	01	Set point: leaving water minimum temperature	25	25~37	1	°C

To prevent misuse concerning leaving water temperatures, it is possible to limit the set points.

- **[C-00]** Set point: leaving water maximum temperature
- **[C-01]** Set point: leaving water minimum temperature

[D] Domestic water heating retention times

First code	Second code	Setting name	Default value	Range	Step	Unit
D	Domestic water heating retention times					
	00	Set point: minimum time for domestic water heating	10	5~20	1	—
	01	Set point: maximum time for domestic water heating	30	10~60	5	—
	02	Set point: interval minimum stop time of domestic water heating	15	5~30	5	—

The heat pump can only work in either space heating operation or domestic water heating operation. No simultaneous operation is possible, except when using multiple set point control.

- **[d-00]** Set point: minimum operation time for domestic water heating
- **[d-01]** Set point: maximum operation time for domestic water heating
- **[d-02]** Set point: interval minimum stop time of domestic water heating

Changing the timer values can have an impact on space heating and domestic water heating heat up timers. The default values are proposed but can be changed depending on the complete system installation.

For a detailed explanation about simultaneous request of space heating and domestic water heating, see control chapter.

[E] Service mode

First code	Second code	Setting name	Default value	Range	Step	Unit
E	Service mode					
	00	Vacuum mode	0	0/1	—	—
	04	Pump only operation	0	0~2	1	—

■ **[E-00] Vacuum mode**

When recovering/vacuuming of the indoor unit is needed, field setting [E-00] should be activated. It will force the unit into thermo OFF and will open the expansion valve of the indoor unit R-134a circuit so full vacuuming is possible.

By default [E-00] = 0, set to 1 to enable the vacuum mode.



Note : Do not forget to restore the field setting [E-00] to the default value when vacuuming is finished!
When [E-00]=0 is set to 1 (recovery mode), [E-04] can be set to 2 to enhance recovery of the refrigerant.

■ **[E-04] Pump only operation**

When commissioning and installing the unit it is very important to get all air out of the water circuit. Through this field setting the pump can be operated without actual operation of the unit. By doing so this will enhance the air removal from the circuit. The pump can operate at different speed:

- [E-04] = 0 normal operation of the unit (default)
- [E-04] = 1 low pump speed operation (pump only, unit is not operating)
- [E-04] = 2 high pump speed operation (pump only, unit is not operating)



- Notes :**
- If you select [E-04]=1 or 2 and [6-00]=1, the unit will activate the domestic hot water 3-way valve. This function is a helpful feature to get all air removed out of the system (as well in space heating as in domestic hot water heating).
 - [E-04]=1 or 2 & [6-00]=0 => Pump operation of 20 minutes. 3-Way valve in space heating mode.
 - [E-04]=1 or 2 & [6-00]=1 => Pump operation of 10 minutes. 3-Way valve in domestic hot water heating mode.
 - Do not forget to restore the field setting [E-04] to the default value when commissioning is finished!
 - When using thermostatic radiator valves, make sure to open all valves during air purging operation.

3.2 Field Setting from Outdoor Unit



Caution

Capacity Setting after changing the main outdoor PC Board (A1P) to spare parts PC Board

When you change the main PC Board (A1P) to spare parts PC Board, please carry out the following setting.

Please Attach the Capacity Setting Adapter corresponding to Capacity Class (ex. 112, 140, 160) in connector X51A.
(See Below)

Capacity Setting Adapter

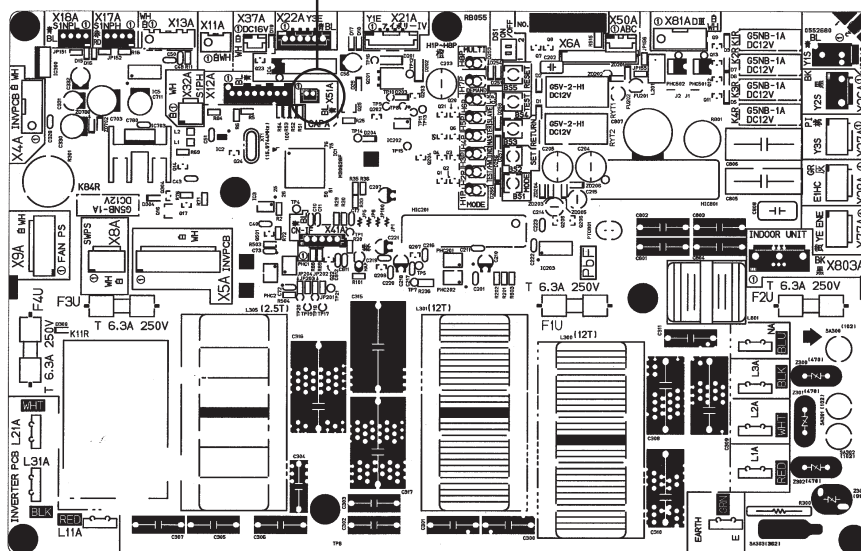
	Capacity Class	Note
①	4 (112)	CAPACITY SETTING ADAPTER (for 11kW/J112)
②	5 (140)	CAPACITY SETTING ADAPTER (for 14kW/J140)
③	6 (160)	CAPACITY SETTING ADAPTER (for 16kW/J160)

Position of Attaching the Capacity Setting Adapter

ERRQ 011/014/016 AAY1

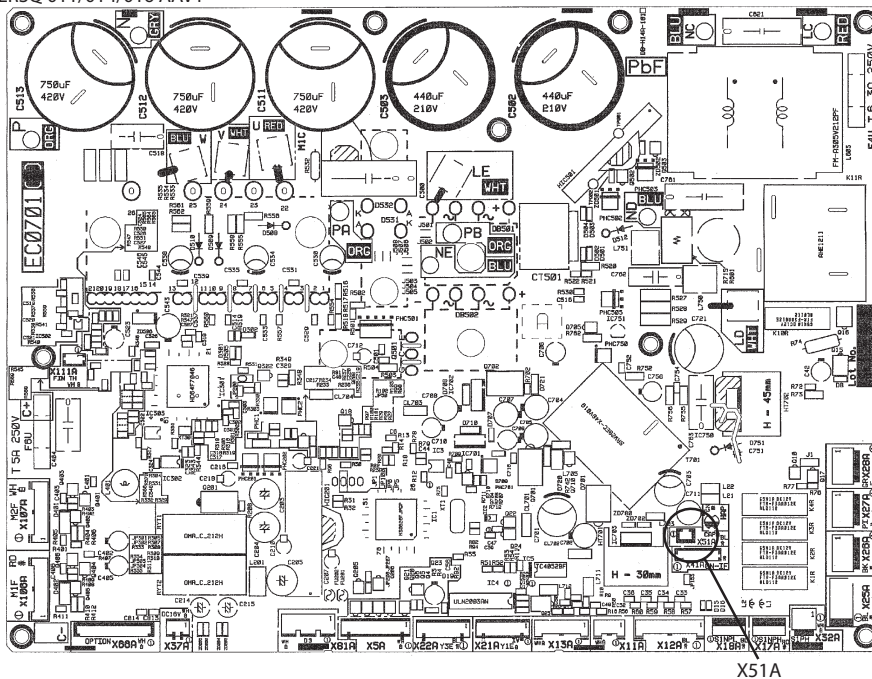
ERSQ 011/014/016 AAY1

X51A



ERRQ 011/014/016 AAV1

ERSQ 011/014/016 AAV1



X51A

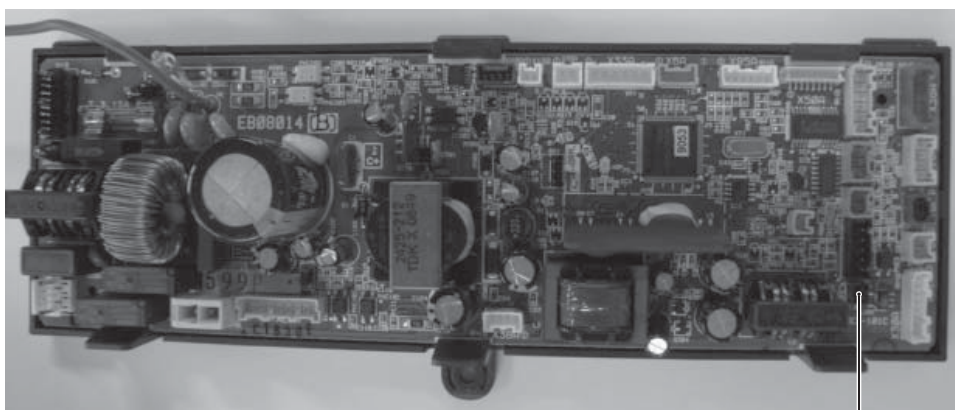
**Caution****Capacity Setting after changing the main indoor PC Board (A1P) to spare parts PC Board**

When you change the main indoor PC Board (A1P) to spare parts PC Board, please carry out the following setting.

Please Attach the Capacity Setting Adapter corresponding to Capacity Class (ex. 112, 140, 160) in connector X23A.
(See Below)

Capacity Setting Adapter

	Capacity Class	Note
①	011 (112)	CAPACITY SETTING ADAPTER (for 011/J112)
②	014 (140)	CAPACITY SETTING ADAPTER (for 014/J140)
③	016 (160)	CAPACITY SETTING ADAPTER (for 016/J160)



X23A

■ LED'S DURING initializing: first 12 minutes after power starting

	H1P	H2P	H3P	H4P	H5P	H6P	H7P	H8P
LED indication	●	◐	◑	●	●	●	●	◐

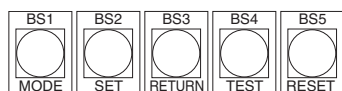
■ Wait until initializing period is over before pressing buttons.

■ Setting by pushbutton switches

The following settings are made by pushbutton switches on PC board.

	H1P	H2P	H3P	H4P	H5P	H6P	H7P
LED indication	●	●	◑	●	●	●	●

(Factory setting = normal operation)



(V2760)

There are the following three setting modes.

① Setting mode 1 (H1P off)

Initial status (when normal): Also indicates during “abnormal”.

② Setting mode 2 (H1P on)

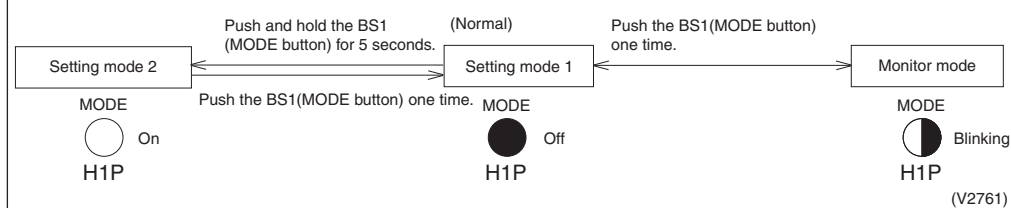
Used to modify the operating status and to set program addresses, etc. Usually used in servicing the system.

③ Monitor mode (H1P blinks)

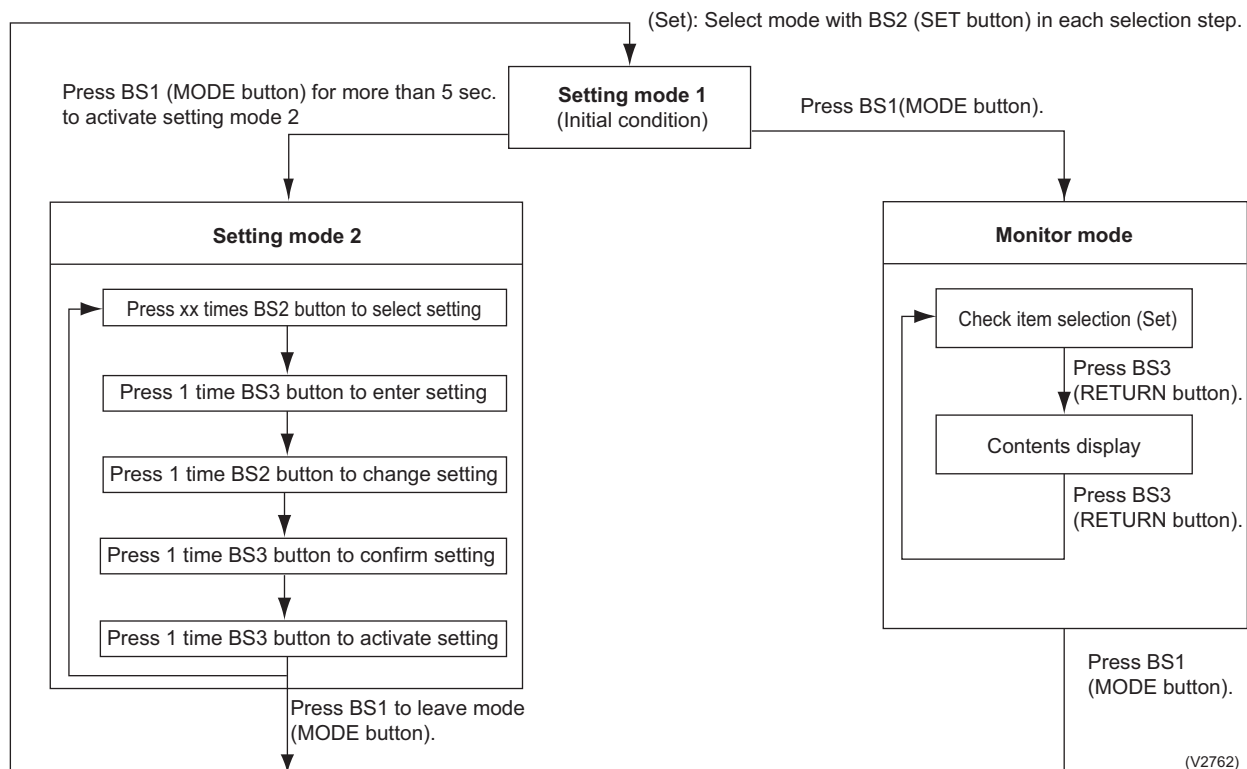
Used to check the program made in Setting mode 2.

■ Mode changing procedure

Using the MODE button, the modes can be changed as follows.



■ Mode changing procedure

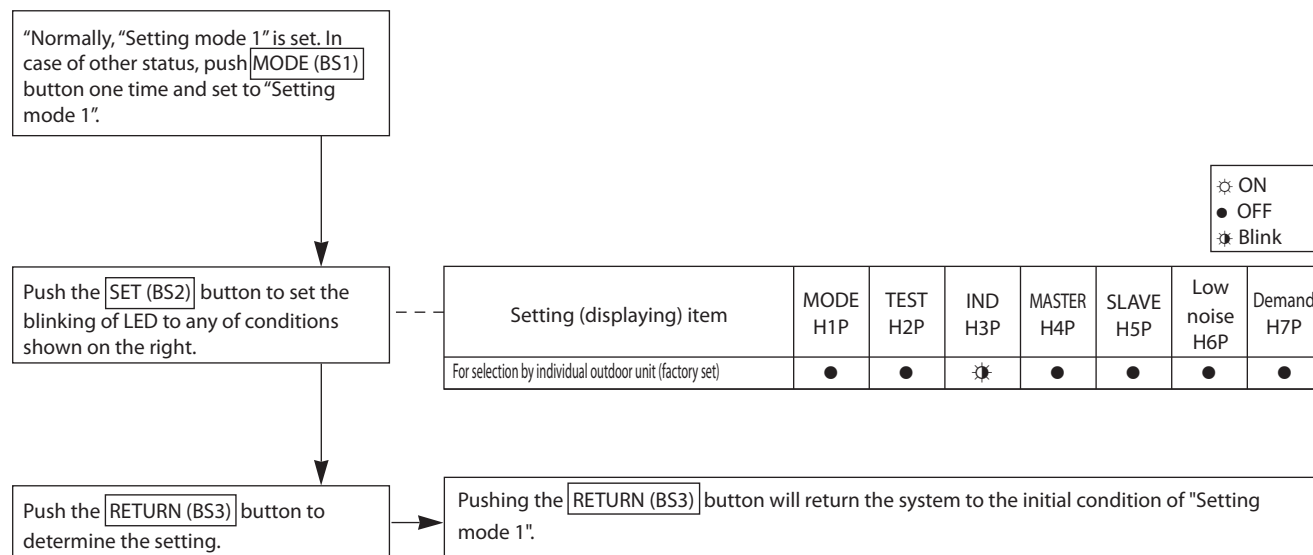


a. "Setting mode 1"

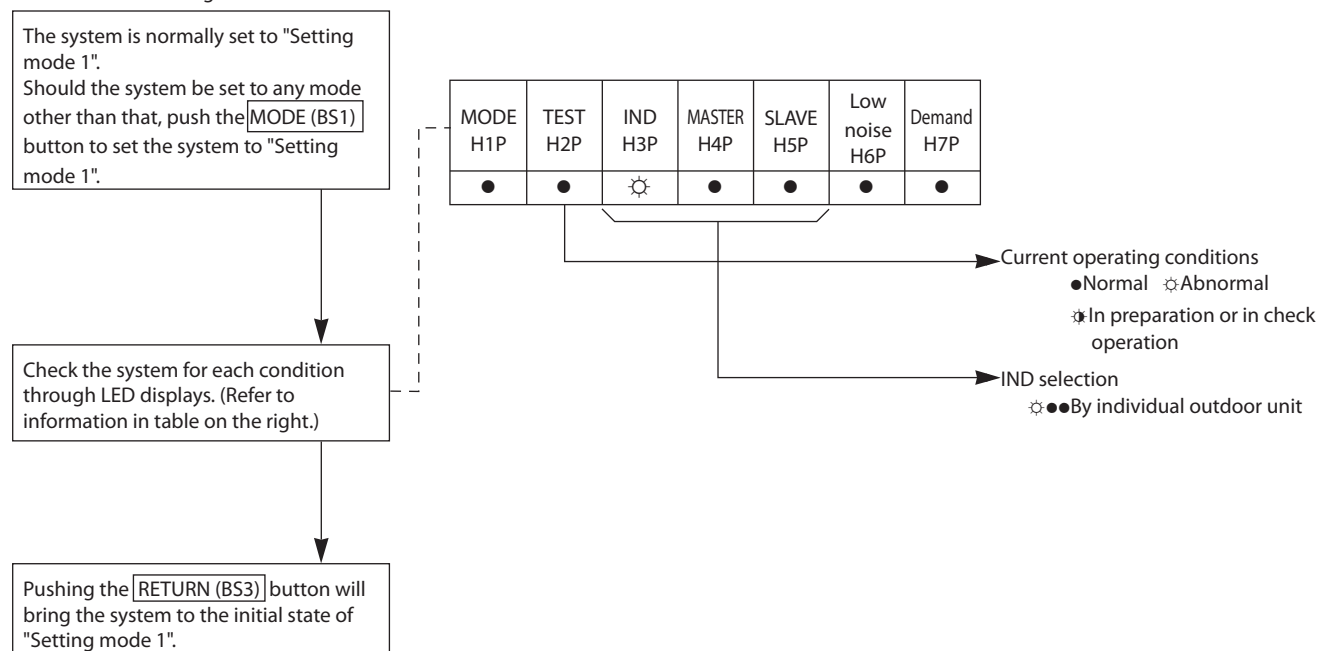
This mode is used to set and check the following items.

1. Set itemsIn order to make IND selection in a batch of outdoor unit group, change the setting.
 - IND selection..... If this setting is changed, U7 error will appear, ONLY FACTORY SETTING IS ALLOWED.
2. Check itemsThe following items can be checked.
 - (1) Current operating conditions (Normal / Abnormal / In check operation)
 - (2) Setting conditions of COOL/HEAT selection (Individual / Batch master / Batch slave)

Procedure for changing COOL/HEAT selection setting

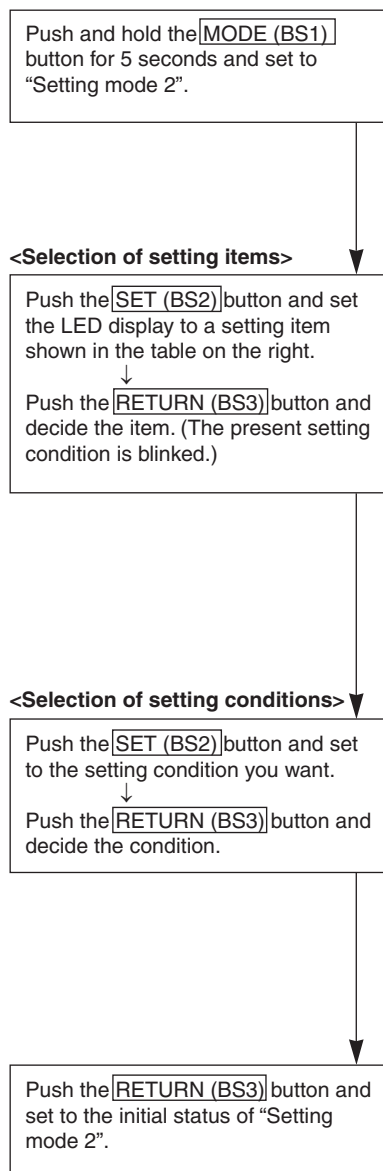


Procedure for checking check items



(V2763)

b. "Setting mode 2"



No.	Setting item	Description
21	Refrigerant recovery / vacuuming mode setting of R-410A circuit	Sets to refrigerant recovery or vacuuming mode.
61	Automatic pump down operation	An automatic pump down operation which will collect all refrigerant from the field piping and indoor unit in the outdoor unit.

The numbers in the "No." column represent the number of times to press the SET (BS2) button.

Remark: Pump down operation is **ONLY ALLOWED** when the refrigerant charge is less than $\leq 4,5\text{kg}$.

* If you become unsure of how to proceed, push the **MODE (BS1)** button and return to setting mode 1.

(V2764)

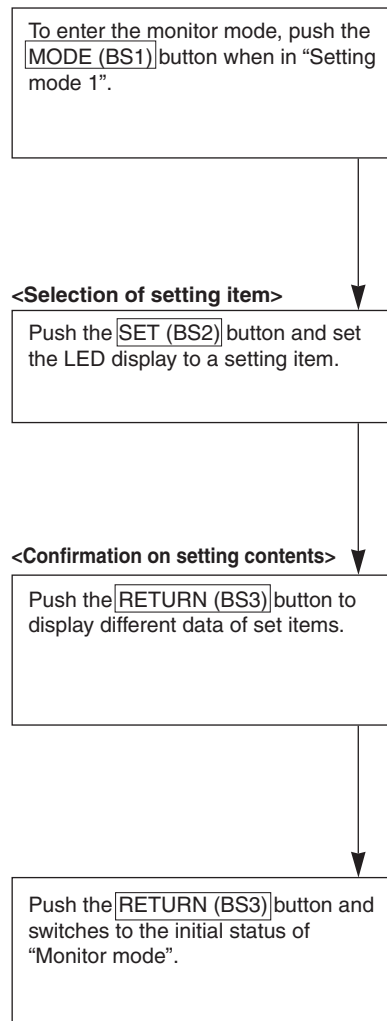
No.	Setting item display								Setting condition display		
	Setting item	MODE H1P	TEST H2P	C/H selection			Low noise H6P	Demand H7P			
				IND H3P	Master H4P	Slave H5P					
											* Factory set
21	Refrigerant recovery / vacuuming mode setting of R-410A circuit								Refrigerant recovery / vacuuming: OFF	●●●●●●*	
									Refrigerant recovery / vacuuming: ON	●●●●●●●	
61	Automatic pump down operation								Pump down: OFF	●●●●●●*	
									Pump down: ON	●●●●●●●	

The numbers in the "No." column represent the number of times to press the SET (BS2) button.



Note : 8HP not important to change settings.

c. Monitor mode



* Push the **MODE (BS1)** button and returns to "Setting mode 1".

(V2765)

No.	Setting item	LED display							Data display
		H1P	H2P	H3P	H4P	H5P	H6P	H7P	
14	Contents of malfunction (the latest)	⊗	●	●	⊗	⊗	⊗	●	Malfunction code table Refer to page 138.
15	Contents of malfunction (1 cycle before)	⊗	●	●	⊗	⊗	⊗	⊗	
16	Contents of malfunction (2 cycle before)	⊗	●	⊗	●	●	●	●	
20	Contents of retry (the latest)	⊗	●	⊗	●	⊗	●	●	
21	Contents of retry (1 cycle before)	⊗	●	⊗	●	⊗	●	⊗	
22	Contents of retry (2 cycle before)	⊗	●	⊗	●	⊗	⊗	●	
25	Normal judgment of outdoor units PC board	⊗	●	⊗	⊗	●	●	⊗	Lower 2 digits: ⊗● Abnormal ●⊗ Normal ●● Unjudgment

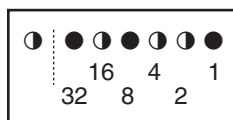
The numbers in the "No." column represent the number of times to press the SET (BS2) button.



Note : 8HP not important to change settings.

Push the SET button and match with the LEDs No. 1 - 15, push the RETURN button, and confirm the data for each setting.

★ Data such as addresses and number of units is expressed as binary numbers; the two ways of expressing are as follows:



The No. 1 cool/heat unified address is expressed as a binary number consisting of the lower 6 digits. (0 - 63)

In ① the address is 010110 (binary number), which translates to $16 + 4 + 2 = 22$ (base 10 number). In other words, the address is 22.

3.2.1 Setting of Refrigerant Recovery Mode

When carrying out the refrigerant collection on site, fully open the respective expansion valve of indoor and outdoor units

All indoor and outdoor unit's operation are prohibited.

[Operation procedure]

- ① In "Setting Mode 2" with units in stop mode, set "B Refrigerant Recovery / Vacuuming mode" (setting 21) to ON. The respective expansion valve of indoor and outdoor units are fully opened. "TEST OPERATION" and "UNDER CENTRALIZED CONTROL" are displayed on the remote control, and the indoor / outdoor unit operation is prohibited.
After setting, do not cancel "Setting Mode 2" until completion of refrigerant recovery operation.
- ② Collect the refrigerant using a refrigerant recovery unit. (See the operation manual attached to the refrigerant recovery unit for more detail.)
- ③ When finished collecting refrigerant, press Mode button "BS1" once and reset "Setting Mode 2".

3.2.2 Setting of Vacuuming Mode

In order to perform vacuuming operation at site, fully open the expansion valves of indoor and outdoor units and turn on some solenoid valves.

[Operating procedure]

- ① In “Setting Mode 2” with units in stop mode, set “B Refrigerant Recovery / Vacuuming mode” (setting 21) to ON. The respective expansion valve of indoor and outdoor units are fully opened. “TEST OPERATION” and “UNDER CENTRALIZED CONTROL” are displayed on the remote control, and the indoor / outdoor unit operation is prohibited.
After setting, do not cancel “Setting Mode 2” until completion of Vacuuming operation.
- ② Use the vacuum pump to perform vacuuming operation.
- ③ When finished vacuuming, press Mode button “BS1” once and reset “Setting Mode 2”.

3.2.3 Setting of Automatic Pump Down Operation

When carrying out the automatic pump down operation, follow below operation procedure.

[Operating procedure]

- ① Turn on the main power supply.
- ② Make sure the liquid stop valve is closed and the gas stop valve is open and that the low pressure switch is working.
- ③ In “Setting Mode 2”, set “Automatic Pump Down” (setting 61) to ON. After setting, do not cancel “Setting Mode 2” until completion of pump down operation.
- ④ The compressor and outdoor unit fan will start operating automatically. During operation, the LED’s are showing the progress.

(☼: ON ●: OFF ✱: BLINK)

	H1P	H2P	H3P	H4P	H5P	H6P	H7P
Step 1	☼	✱	☼	☼	☼	☼	☼
Step 2	☼	✱	●	☼	☼	☼	☼
Step 3	☼	✱	●	●	☼	☼	☼
Step 4	☼	✱	●	●	●	☼	☼
Step 5	☼	✱	●	●	●	●	☼
Step 6	☼	✱	●	●	●	●	✱

- ⑤ If step 6 is reached (pressure drops below 3 bar) or if operation stops, close the gas stop valve.
- ⑥ Turn off the main power supply.

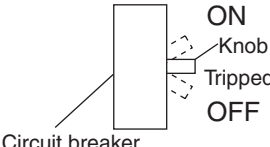
Remark: Make sure to re-open both stop valves before restarting the unit.

Part 7 - Troubleshooting

1. Symptom-based Troubleshooting	129
2. Troubleshooting by Remote Control.....	131
2.1 The INSPECTION / TEST Button	131
2.2 Self-diagnosis by Wired Remote Control.....	132
2.3 Operation of the Remote Controller's Inspection / Test Operation Button.....	133
2.4 Remote Control Service Mode	134
2.5 Remote Controller Self-Diagnosis Function	136
3. Troubleshooting by Indication on the Remote Controller	142
3.1 "A1" Indoor Unit: PC Board Defect.....	142
3.2 "A6" Indoor Unit: Pump Error (M1P) or Other Water System Error	143
3.3 "A9" Indoor Unit: Malfunction of Moving Part of Electronic Expansion Valve (K1E) R-410A circuit.....	144
3.4 "AE" Indoor Unit: Water Circuit Error	146
3.5 "AJ" Indoor Unit: Malfunction of Capacity Determination Device.....	147
3.6 "C1" Indoor Unit: Failure of Transmission (Between Indoor unit PC Board and Control PC Board).....	148
3.7 "C4" Indoor Unit: Malfunction of Thermistor (R3T) Liquid Thermistor R-410A	150
3.8 "C5" Indoor Unit: Malfunction of Tank Thermistor (R2T)	151
3.9 "C9" Indoor Unit: Return Water Thermistor (R4T)	152
3.10 "CA" Indoor Unit: Leaving Water Thermistor Error (R5T)	153
3.11 "CJ" Indoor Unit: Malfunction of Thermostat Sensor in Remote Controller ..	154
3.12 "E1" Outdoor Unit: PC Board Defect	155
3.13 "E1" Indoor Unit: PC Board Defect	156
3.14 "E3" Outdoor Unit: Actuation of High Pressure Switch	157
3.15 "E3" Indoor Unit: Actuation of High Pressure Switch.....	159
3.16 "E4" Outdoor Unit: Actuation of Low Pressure Sensor	162
3.17 "E4" Indoor Unit: Actuation of Low Pressure Sensor.....	164
3.18 "E5" Outdoor Unit: Inverter Compressor Motor Lock.....	166
3.19 "E5" Indoor Unit: Inverter Compressor Motor Lock	167
3.20 "E7" Malfunction of Outdoor Unit Fan Motor	168
3.21 "E9" Outdoor Unit: Malfunction of Moving Part of Electronic Expansion Valve	170
3.22 "E9" Indoor Unit: Malfunction of Moving Part of Electronic Expansion Valve (K2E) R-134a circuit.....	172
3.23 "F3" Outdoor Unit: Abnormal Discharge Pipe Temperature	174
3.24 "F3" Indoor Unit: Abnormal Discharge Pipe Temperature.....	175
3.25 "H9" Outdoor Unit: Malfunction of Thermistor (R1T) for Outdoor Air	176
3.26 "J3" Outdoor Unit: Malfunction of Discharge Pipe Thermistor (R2T).....	177
3.27 "J3" Indoor Unit: Malfunction of Discharge Pipe Thermistor (R6T)	178
3.28 "J5" Outdoor Unit: Malfunction of Thermistor (R3T, R5T) for Suction Pipe 1, 2	179
3.29 "J5" Indoor Unit: Malfunction of Thermistor (R7T) for Liquid R-134a.....	180
3.30 "J6" Outdoor Unit: Malfunction of Thermistor (R6T) for Outdoor Unit Heat Exchanger.....	181
3.31 "J7" Outdoor Unit: Malfunction of Thermistor (R7T) for Outdoor Unit Liquid Pipe.....	182

3.32	“J9” Outdoor Unit: Malfunction of Thermistor (R4T) for Subcooling Heat Exchanger Gas Pipe	183
3.33	“JA” Outdoor Unit: Malfunction of High Pressure Sensor	184
3.34	“JA” Indoor Unit: Malfunction of High Pressure Sensor	185
3.35	“JC” Outdoor Unit: Malfunction of Low Pressure Sensor	186
3.36	“JC” Indoor Unit: Malfunction of Low Pressure Sensor	187
3.37	“L1” Outdoor Unit: Malfunction of PC Board	188
3.38	“L1” Indoor Unit: Malfunction of PC Board	189
3.39	“L4” Outdoor Unit: Malfunction of Inverter Radiating Fin Temperature Rise	190
3.40	“L4” Indoor Unit: Malfunction of Inverter Radiating Fin Temperature Rise (R8T)	191
3.41	“L5” Outdoor Unit: Inverter Compressor Abnormal - R-410A	192
3.42	“L5” Indoor Unit: Inverter Compressor Abnormal - R-134a	193
3.43	“L8” Outdoor Unit: Inverter Current Abnormal	194
3.44	“L8” Indoor Unit: Inverter Current Abnormal	195
3.45	“L9” Outdoor Unit: Inverter Start up Error	196
3.46	“L9” Indoor Unit: Inverter Start up Error	197
3.47	“LC” Outdoor Unit: Malfunction of Transmission between Inverter and Control PC Board	198
3.48	“LC” Indoor Unit: Malfunction of Transmission between Inverter and Control PC Board	199
3.49	“LH” Indoor Unit: Converter Error	200
3.50	“P1” Outdoor Unit: High Voltage of Capacitor in Main Inverter Circuit	201
3.51	“P1” Indoor Unit: High Voltage of Capacitor in Main Inverter Circuit	202
3.52	“PJ” Indoor Unit: Faulty Combination of PCB	203
3.53	“U0” Low Pressure Drop Due to Refrigerant Shortage or Electronic Expansion Valve Failure	204
3.54	“U2” Power Supply Insufficient or Instantaneous Failure	206
3.55	“U2” Power Supply Insufficient or Instantaneous Failure	208
3.56	“U4” Malfunction of Transmission between Indoor Unit and Outdoor Unit...	210
3.57	“U4” Malfunction of Transmission Indoor Unit	212
3.58	“U5” Malfunction of Transmission between Remote Control and Indoor Unit.....	213
3.59	“U7” Indoor Unit: Malfunction of Transmission Outdoor Unit	214
3.60	“U8” Malfunction of Transmission between Main and Sub Remote Controls	215
3.61	“UA” Communication Error between Outdoor Unit and Indoor Unit	216
3.62	“UF” System is not Set yet	217
3.63	“UH” Malfunction of System, Refrigerant System Address Undefined	218

1. Symptom-based Troubleshooting

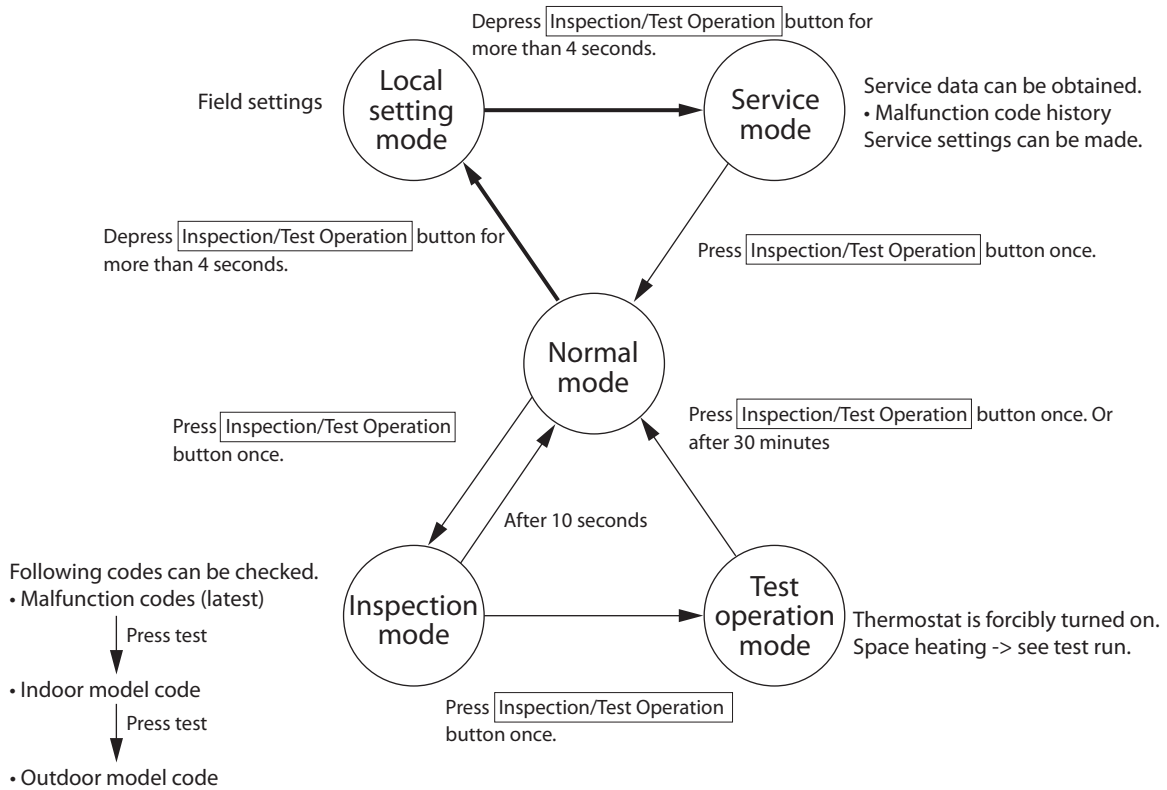
	Symptom	Supposed Cause	Countermeasure
1	The system does not start operation at all.	Blowout of fuse(s)	Turn Off the power supply and then replace the fuse(s).
		Cutout of breaker(s)	<ul style="list-style-type: none"> If the knob of any breaker is in its OFF position, turn ON the power supply. If the knob of any circuit breaker is in its tripped position, do not turn ON the power supply. 
		Power failure	After the power failure is reset, restart the system.
		Open phase in power supply cable	Check power supply. After that, properly connect the power supply cable, and then turn ON the power supply.
2	The system starts operation but makes an immediate stop.	Blocked air inlet or outlet of outdoor unit	Remove obstacle(s).
3	The unit is turned on but the unit is not heating as expected.	The temperature setting is not correct.	Check the controller set point + settings (room + water).
		Capacity shortage.	Check if the cooling fans at the rear of the switch box are working properly.
		The water volume in the installation is too low.	Make sure that the water volume in the installation is above the minimum required value. Check if there is no bypass of the water circuit.
		The water flow is too low.	<ul style="list-style-type: none"> Check that all shut-off valves of the water circuit are completely open. Check if the water filter needs cleaning. Make sure there is no air in the system (purge air). Make sure that the expansion vessel is not broken. Check the water pressure on the manometer > 0,3 bar.
4	The system does not operate.	The system stops and immediately restarts operation.	Normal operation. The system will automatically start operation after a lapse of five minutes.
		The remote control displays "UNDER CENTRALIZED CONTROL", which blinks for a period of several seconds when the OPERATION button is depressed.	Recovery/vacuum mode is active (higher priority mode).
		The system stops immediately after turning ON the power supply.	Wait for a period of approximately one minute.
5	The system makes intermittent stops.	The remote control displays malfunction codes "U4" and "U5", and the system stops but restarts after a lapse of several minutes.	The system stops due to an interruption in communication between units caused by electrical noises coming from equipment other than air conditioners.
			Remove causes of electrical noises. If these causes are removed, the system will automatically restart operation.

	Symptom	Supposed Cause	Countermeasure
6	The system produces sounds.	<Indoor unit> Immediately after turning ON the power supply, indoor unit produces "ringing" sounds.	These are operating sounds of the electronic expansion valve of the indoor unit.
		<Indoor and outdoor units> "Hissing" sounds are continuously produced while in cooling or defrosting operation.	Normal operation.
		<Indoor and outdoor units> "Hissing" sounds are produced immediately after the startup or stop of the system, or the startup or stop of defrosting operation.	Normal operation.
		<Indoor unit> "Creaking" sounds are produced while in heating operation or after stopping the operation.	Normal operation.
		<Outdoor unit> Pitch of operating sounds changes.	Normal operation.
		The pump is making noise (cavitation).	There is air in the system.
		Water pressure at pump inlet is too low.	Purge air. <ul style="list-style-type: none"> • Check on the manometer that is sufficient water pressure. The water pressure must be > 0,3 bar. • Check that the manometer is not broken. • Check that the expansion vessel is not broken. • Check if the pressure of the expansion vessel is correct.
7	Outdoor unit fan does not rotate.	In operation	The reason is that fan revolutions are controlled to put the operation to the optimum state.
8	LCD display "88" appears on the remote control.	Immediately after turning ON the power supply	The reason is that the system is checking to be sure the remote control is normal.
9	The outdoor gets hot.	While stopping operation	The reason is that the compressor is warmed up to provide smooth startup of the system.
10	The water pressure relief valve leaks.	The expansion vessel is broken.	Replace the expansion vessel.
		The water volume in the installation is too high.	Make sure that the water volume in the installation is under the maximum allowed value.
		Dirt is blocking the water pressure relief valve.	Check for correct operation of the pressure relief valve by turning the red knob on the valve counter clockwise: <ul style="list-style-type: none"> • You should hear a clocking sound. • In case the water keeps running out of the unit, close both the water inlet and outlet shut-off valves first and then replace the relief valve.
11	Malfunction of the schedule timer.	The schedule timer does not work but the programmed actions are executed at the wrong time.	Check if the clock and the day of the week are set correctly, correct if necessary.

2. Troubleshooting by Remote Control

2.1 The INSPECTION / TEST Button

The following modes can be selected by using the [Inspection/Test Operation] button on the remote control.



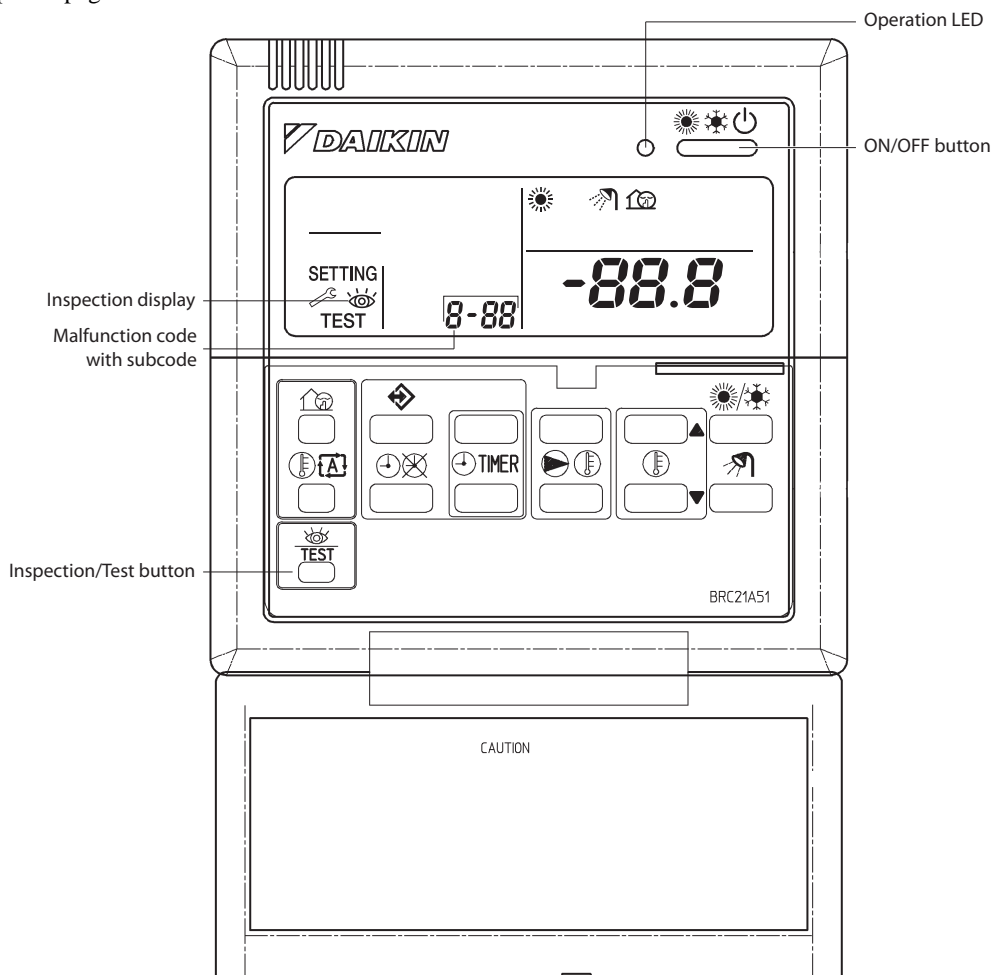
(V0815)

See "Operation of the Remote Controller's Inspection / Test Operation Button".

2.2 Self-diagnosis by Wired Remote Control

Explanation

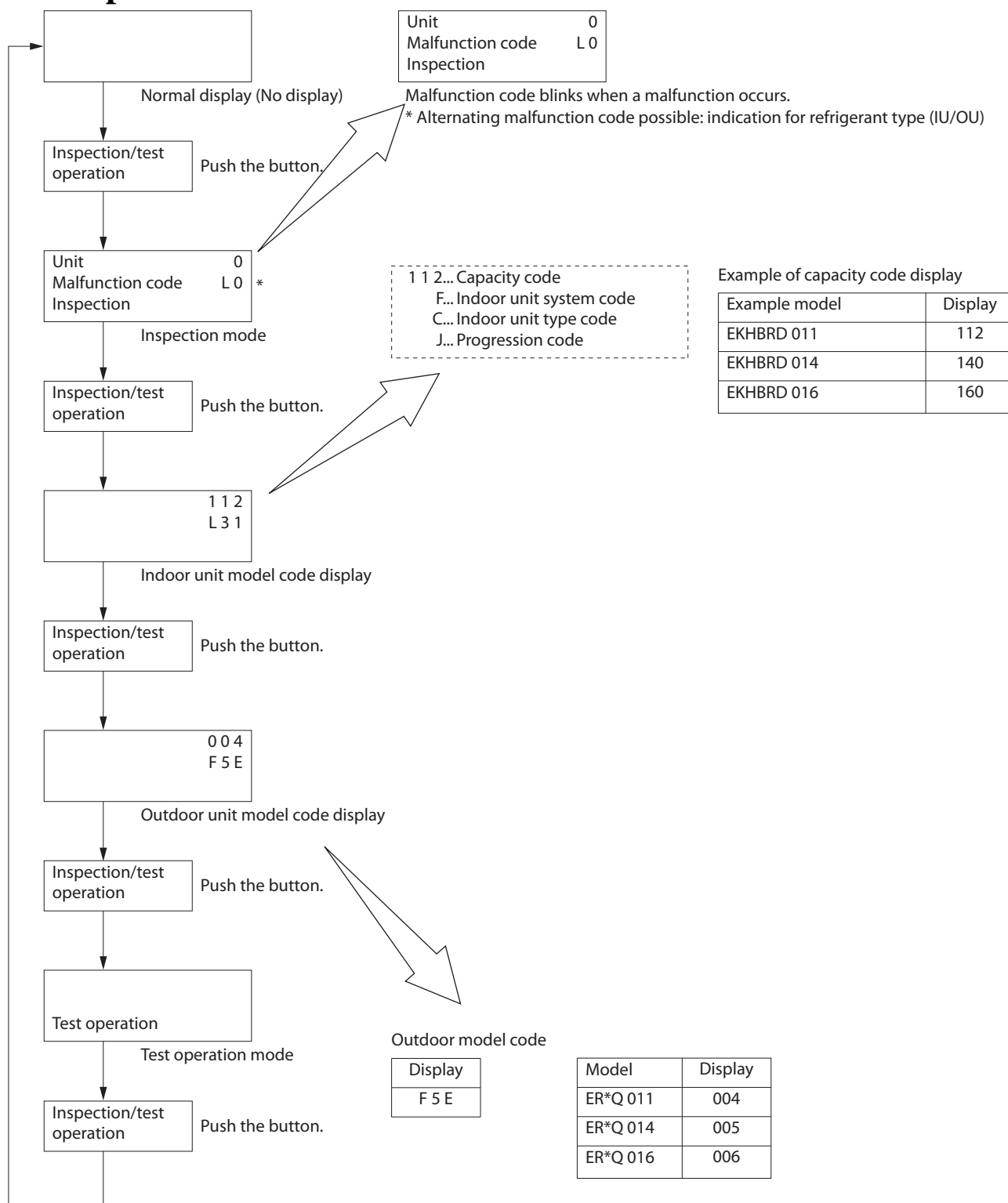
If operation stops due to malfunction, the remote control's operation LED blinks, and malfunction code is displayed. (Even if stop operation is carried out, malfunction contents are displayed when the inspection mode is entered.) The malfunction code enables you to tell what kind of malfunction caused operation to stop. See page 137 for malfunction code and malfunction contents.



Note:

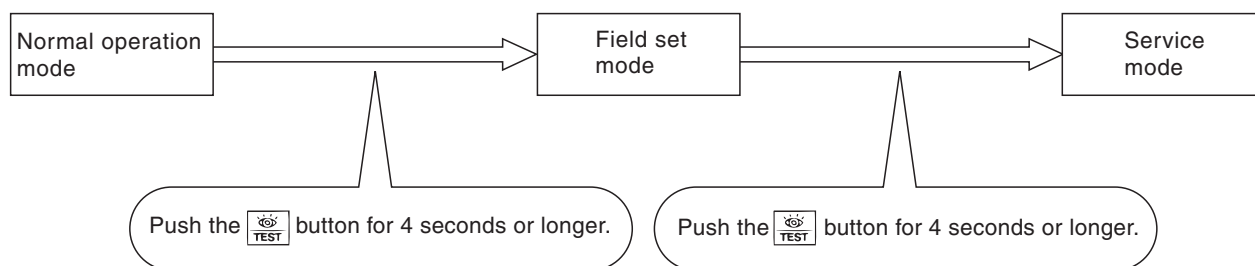
1. Pressing the INSPECTION/TEST button will blink the check indication.
2. While in check mode, pressing and holding the ON/OFF button for a period of five seconds or more will clear the failure history indication shown above. In this case, on the codes display, the malfunction code will blink twice and then change to "00" (=Normal), the Unit No. will change to "0", and the operation mode will automatically switch from check mode to normal mode (displaying the set temperature).
3. Subcode is needed to indicate which refrigerant system is causing the error.

2.3 Operation of the Remote Controller's Inspection / Test Operation Button



2.4 Remote Control Service Mode

How to Enter the Service Mode




(VF020)

Service Mode

Operation Method

1. Select the mode No.

Only Mode 40 can be set.

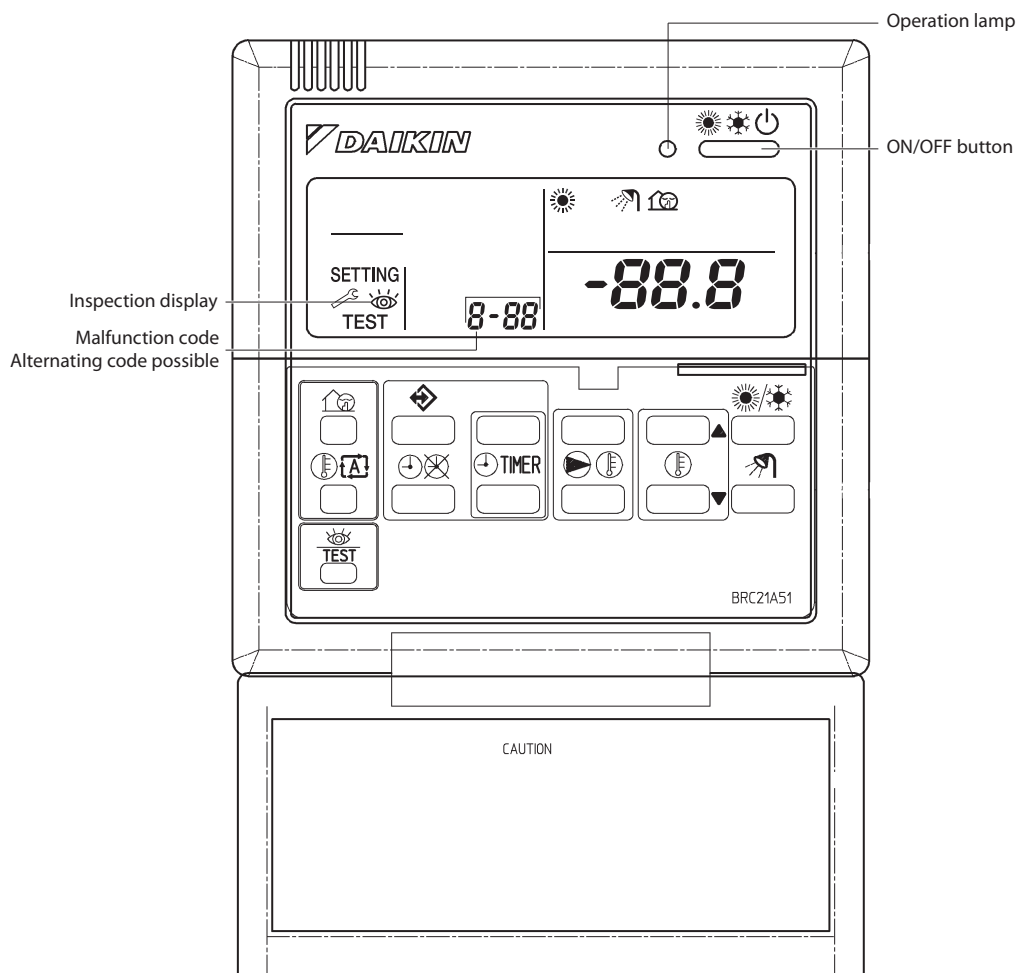
Mode No	Function	Contents and operation method	Remote control display example
40	Malfunction hysteresis display	Display malfunction hysteresis.	
		The history No. can be changed with the  button.	

Remark: The malfunction code can give also an extra subcode (alternating). With this subcode we can distinguish if the error is related to the R-410A or R-134a circuit.

2.5 Remote Controller Self-Diagnosis Function


The remote controller switches are equipped with a self diagnosis function so that more appropriate maintenance can be carried out. If a malfunction occurs during operation, the operation lamp, malfunction code and display of malfunctioning unit No. let you know the contents and location of the malfunction.

When there is a stop due to malfunction, the contents of the malfunction given below can be diagnosed by a combination of operation lamp, INSPECTION display of the liquid crystal display and display of malfunction code. It also lets you know the unit No. during group control.



☼: ON ●: OFF ☼: Blink

	Malfunction code	Operation lamp	Malfunction contents	Page Referred
	A1	☼	PC board defect, E ² PROM defect	142
	A6	☼	Pump error	143
	A9	☼	Malfunction of moving part of electronic expansion valve (Y1E)	144
	AJ	☼	Malfunction of capacity setting	147
	C1	☼	Failure of transmission (between indoor unit PC board and fan PC board)	148
	C4	☼	Malfunction of thermistor (R3T) for R-410A liquid/indoor unit (loose connection, disconnection, short circuit, failure)	150
	C5	☼	Malfunction of thermistor (R2T) for tank thermistor (loose connection, disconnection, short circuit, failure)	151
	C9	☼	Malfunction of thermistor (R4T) for return water thermistor (loose connection, disconnection, short circuit, failure)	152
	CA	☼	Malfunction of thermistor (R5T) for leaving water temperature (loose connection, disconnection, short circuit, failure)	153
	CJ	☼	Malfunction of thermostat sensor in remote control	154
	E1	☼	PC board defect	155
	E3	☼	Actuation of high pressure switch	157
	E4	☼	Actuation of low pressure sensor	162
	E5	☼	Compressor motor lock	166
	E6	☼	Standard compressor lock or over current	—
	E7	☼	Malfunction of outdoor unit fan motor	168
	E9	☼	Malfunction of moving part of electronic expansion valve (Y1E, Y3E)	170
	F3	☼	Abnormal discharge pipe temperature	174
	H9	☼	Malfunction of thermistor (R1T) for outdoor air (loose connection, disconnection, short circuit, failure)	176
	J2	☼	Current sensor malfunction	—
	J3	☼	Malfunction of discharge pipe thermistor (R2T, R6T) (loose connection, disconnection, short circuit, failure)	177
	J5	☼	Malfunction of thermistor (R3T, R5T, R7T) for suction pipe (loose connection, disconnection, short circuit, failure)	179
	J6	☼	Malfunction of thermistor (R6T) for heat exchanger (loose connection, disconnection, short circuit, failure)	181
	J7	☼	Malfunction of thermistor (R7T) for outdoor unit liquid pipe	182
	J9	☼	Malfunction of subcooling heat exchanger gas pipe thermistor (R4T)	183
	JA	☼	Malfunction of high pressure sensor IU/OU	184
	JC	☼	Malfunction of low pressure sensor IU/OU	186
	L1	☼	Malfunction of PC board	188
	L4	☼	Malfunction of inverter radiating fin temperature rise	190
	L5	☼	Inverter compressor abnormal	192
	L8	☼	Inverter current abnormal	194
	L9	☼	Inverter start up error	196
System	LC	☼	Malfunction of transmission between inverter and control PC board	198
	P1	☼	High voltage of capacitor in main inverter circuit.	201
	PJ	☼	Faulty combination of PCB	203
	U0	☼	Low pressure drop due to refrigerant shortage or electronic expansion valve failure	204
	U2	☼	Power supply insufficient or instantaneous failure	206
	U4	☼	Malfunction of transmission between indoor and outdoor unit	210
	U5	☼	Malfunction of transmission between remote control and indoor unit	213
	U5	●	Failure of remote control PC board or setting during control by remote control	213
	U7	☼	Malfunction of transmission outdoor unit	214
	U8	☼	Malfunction of transmission between main and sub remote controls (malfunction of sub remote control)	215
	UA	☼	Communication error between outdoor unit and indoor unit	216
	UF	☼	System is not set yet	204
	UH	☼	Malfunction of system, refrigerant system address undefined	205

 The system operates for malfunction codes indicated in black squares, however, be sure to check and repair.

Malfunction code indication by outdoor unit PC board

<Monitor mode>

To enter the monitor mode, push the **MODE (BS1)** button when in "Setting mode 1".

<Selection of setting item>

Push the **SET (BS2)** button and set the LED display to a setting item.

<Confirmation of malfunction 1>

Push the **RETURN (BS3)** button once to display "First digit" of malfunction code.

<Confirmation of malfunction 2>

Push the **SET (BS2)** button once to display "Second digit" of malfunction code.

<Confirmation of malfunction 3>

Push the **SET (BS2)** button once to display "malfunction location".

<Confirmation of malfunction 4>

Push the **SET (BS2)** button once to display "master or slave 1 or slave 2" and "malfunction location".

Push the **RETURN (BS3)** button and switches to the initial status of "Monitor mode".

* Push the **MODE (BS1)** button and returns to "Setting mode 1".

Detail description on next page.

Contents of malfunction		Malfunction code
In-phase malfunction of DIII Net	Detection of DIII Net	E1
Abnormal discharge pressure	HPS activated	E3
Abnormal suction pressure	Abnormal Pe	E4
Compressor lock	Detection of INV compressor lock	E5
Over load, over current, abnormal lock of outdoor unit fan motor	Detection of DC fan 1 motor lock	E7
	Detection of DC fan 2 motor lock	
Malfunction of electronic expansion valve	EV1	E9
	EV3	
Faulty sensor of outdoor air temperature	Faulty Ta sensor (short)	H9
Abnormal discharge pipe temperature	Abnormal Td	F3
Abnormal heat exchanger temperature	Refrigerant over charge	F6
Faulty sensor of discharge pipe temperature	Faulty Tdi sensor (short)	J3
Faulty sensor of suction pipe temperature	Faulty Ts1 sensor (short)	J5
	Faulty Ts2 sensor (short)	
Faulty sensor of heat exchanger temperature	Faulty Tb sensor (short)	J6
Malfunction of the liquid pipe temperature sensor	Faulty TI sensor (short)	J7
Faulty sensor of subcool heat exchanger temperature	Faulty Tsh sensor (short)	J9
Faulty sensor of discharge pressure	Faulty Pc sensor (short)	JA
Faulty sensor of suction pressure	Faulty Pe sensor (short)	JC
Faulty Inverter PC board	Faulty IPM	L1
	Abnormal Current sensor offset	
	Abnormal IGBT	
	Faulty Current sensor	
	Abnormal SP-PAM over-voltage	
Inverter radiation fin temperature rising	Over heating of inverter radiation fin temperature	L4
DC output over current	Inverter instantaneous over current	L5
Electronic thermal	Electronic thermal switch 1	L8
	Electronic thermal switch 2	
	Out-of-step	
	Speed down after startup	
	Lightening detection	
Stall prevention (Limit time)	Stall prevention (Current increasing)	L9
	Stall prevention (Faulty start up)	
	Abnormal wave form in startup	
	Out-of-step	
Transmission error between inverter and outdoor unit	Inverter transmission error	LC

☼: ON ●: OFF ✨: Blink

Malfunction code	Confirmation of malfunction 1							Confirmation of malfunction 2							Confirmation of malfunction 3							Confirmation of malfunction 4						
	H1P	H2P	H3P	H4P	H5P	H6P	H7P	H1P	H2P	H3P	H4P	H5P	H6P	H7P	H1P	H2P	H3P	H4P	H5P	H6P	H7P	H1P	H2P	H3P	H4P	H5P	H6P	H7P
E1	☼			●	●	☼	☼	☼			●	●	●	☼	☼	☼	●	●	●	●	●	☼	☼	☼	●	●	☼	☼
E3								☼			●	●	☼	☼	☼			●	●	●	●	☼			●	●	*1	
E4								☼			●	☼	●	●	☼			●	●	●	●	☼			●	●		
E5								☼			●	☼	●	☼	☼			●	●	●	●	☼			●	●		
E7								☼			●	☼	☼	☼	☼			●	●	●	●	☼			●	☼		
E9								☼			☼	●	●	☼	☼			●	●	●	●	☼			●	●		
H9								☼			☼	●	●	☼	☼			●	●	●	●	☼			●	●	*1	
F3	☼			●	☼	●	☼	☼			●	●	☼	☼	☼			●	●	●	●	☼			●	●	*1	
F6								☼			●	☼	☼	●	☼			●	●	●	●	☼			●	●	☼	☼
J3	☼			●	☼	☼	●	☼			●	●	☼	☼	☼			●	●	●	●	☼			●	●	*1	
J5								☼			●	☼	●	☼	☼			●	●	●	●	☼			●	☼		
J6								☼			●	☼	☼	●	☼			●	●	●	●	☼			●	●		
J7								☼			●	☼	☼	☼	☼			●	●	●	●	☼			●	●		
J9								☼			☼	●	●	☼	☼			●	●	●	●	☼			●	●		
JA								☼			☼	●	☼	●	☼			●	●	●	●	☼			●	●		
JC								☼			☼	☼	☼	●	☼			●	●	●	●	☼			●	●		
L1	☼			●	☼	☼	☼	☼			●	●	●	☼	☼			●	●	●	●	☼			●	●	●	●
								☼			●	●	●	☼	☼			●	●	●	●	☼			●	●	●	☼
								☼			●	●	●	☼	☼			●	●	●	●	☼			●	●	☼	☼
								☼			●	●	●	☼	☼			●	●	●	●	☼			●	●	☼	☼
								☼			●	●	●	☼	☼			●	●	●	●	☼			●	☼	●	●
L4								☼			●	☼	●	●	☼			●	●	●	●	☼			●	●	*1	
L5								☼			●	☼	●	☼	☼			●	●	●	●	☼			●	●		
L8								☼			☼	●	●	●	☼			●	●	●	●	☼			●	●		
								☼							☼			●	●	●	●	☼			●	☼		
								☼							☼			●	●	●	●	☼			●	●		
								☼							☼			●	●	●	●	☼			●	●		
								☼							☼			●	●	●	●	☼			●	●		
L9								☼			☼	●	●	☼	☼			●	●	●	●	☼			●	●	*1	
								☼							☼			●	●	●	●	☼			●	☼		
								☼							☼			●	●	●	●	☼			●	●		
LC								☼			☼	☼	●	●	☼			●	●	●	●	☼			●	☼	*1	

Display of contents of
malfunction (first digit)Display of contents of
malfunction (second digit)Display 1 of
malfunction in detailDisplay 2 of
malfunction in detail

*1

●	●	Master
●	☼	Slave1
☼	●	Slave2
☼	☼	System

<Monitor mode>

To enter the monitor mode, push the **MODE (BS1)** button when in "Setting mode 1".

<Selection of setting item>

Push the **SET (BS2)** button and set the LED display to a setting item.

<Confirmation of malfunction 1>

Push the **RETURN (BS3)** button once to display "First digit" of malfunction code.

<Confirmation of malfunction 2>

Push the **SET (BS2)** button once to display "Second digit" of malfunction code.

<Confirmation of malfunction 3>

Push the **SET (BS2)** button once to display "malfunction location".

<Confirmation of malfunction 4>

Push the **SET (BS2)** button once to display "master or slave 1 or slave 2" and "malfunction location".

Push the **RETURN (BS3)** button and switches to the initial status of "Monitor mode".

* Push the **MODE (BS1)** button and returns to "Setting mode 1".

Detail description on next page.

Contents of malfunction		Malfunction code
Open phase/Power supply imbalance	Imbalance of inverter power supply voltage	P1
Faulty temperature sensor of inverter radiation fin	Faulty thermistor of inverter fin	P4
Refrigerant shortage	Refrigerant shortage alarm	U0
Abnormal power supply voltage	Insufficient Inverter voltage	U2
	Faulty charge of capacitor in main inverter circuit	
	Malfunction due to SP-PAM overvoltage	
	Malfunction due to P-N short circuit	
No implementation of test-run		U3
Transmission error between indoor and outdoor unit	I/O transmission error	U4
	I/O transmission error	
Incorrect setting in "setting mode 1"	COOL/HEAT selector is not set to IND	U7
Transmission error of other system	Indoor unit system abnormal in other system or other indoor unit system abnormal in own system	U9
Erroneous field setting	System transmission malfunction	UA
	Overconnection malfunction of indoor units	
	Malfunction of field setting	
	Refrigerant abnormal	
Faulty system malfunction	Wiring error (Auto-address error)	UH
Conflict in wiring and piping, no setting for system	Conflict in wiring and piping	UF

☼: ON ●: OFF ☼: Blink

Malfunction code	Confirmation of malfunction 1							Confirmation of malfunction 2							Confirmation of malfunction 3							Confirmation of malfunction 4						
	H1P	H2P	H3P	H4P	H5P	H6P	H7P	H1P	H2P	H3P	H4P	H5P	H6P	H7P	H1P	H2P	H3P	H4P	H5P	H6P	H7P	H1P	H2P	H3P	H4P	H5P	H6P	H7P
P1	☼			☼	●	●	●	☼			●	●	●	☼	☼			●	●	●	●	☼			●	●	*1	
P4				☼	●	●	●	☼			●	☼	●	●	☼			●	●	●	●	☼			●	●		
U0	☼			☼	●	●	☼	☼			●	●	●	●	☼			●	●	●	●	☼			●	●	☼	☼
U2								☼			●	●	☼	●	☼			●	●	●	●	☼			●	●	*1	
																		●	●	●	●				●	☼		
																		●	●	●	●	☼			●	●	☼	●
																		●	●	●	●	☼			●	●	●	☼
U3								☼			●	●	☼	☼	☼			●	●	●	●	☼			●	●	☼	☼
U4								☼			●	☼	●	●	☼			●	●	●	●	☼			●	●	☼	☼
U7								☼			●	☼	☼	☼				●	●	●	●	☼			●	☼	☼	☼
U9								☼			☼	●	●	☼	☼			●	●	●	●	☼			●	●	☼	☼
UA								☼			☼	●	☼	●	☼			●	●	●	●	☼			●	●	☼	☼
																		●	●	●	●	☼			●	☼	☼	☼
																		●	●	●	●	☼			☼	●	☼	☼
																		●	●	●	☼	☼			●	●	☼	☼
UH								☼			☼	●	☼	☼	☼			●	●	●	●	☼			●	☼	☼	☼
UF								☼			☼	☼	☼	☼	☼			●	●	●	●	☼			●	●	☼	☼

Display of contents of malfunction (first digit)

Display of contents of malfunction (second digit)

Display 1 of malfunction in detail

Display 2 of malfunction in detail

*1

●	●	Master
●	☼	Slave1
☼	●	Slave2
☼	☼	System